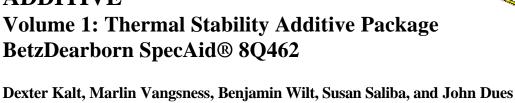
AFRL-PR-WP-TR-2000-2015

(Supercedes AFRL-PR-WP-TR-2000-2021)

FUEL AND FUEL SYSTEM MATERIALS COMPATIBILITY TEST PROGRAM FOR A JP-8 +100 FUEL **ADDITIVE**

BetzDearborn SpecAid® 8Q462



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OCTOBER 2001

Final Report for 01 June 1994 – 29 July 1999

Approved for public release; distribution is unlimited. (ASC-03-0531)

PROPULSION DIRECTORATE AIR FORCE RESEARCH LABORATORY AIR FORCE MATERIEL COMMAND WRIGHT-PATTERSON AIR FORCE BASE, OH 45433-7251



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REPORT DOCUMENTATION PAGE

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2. REPORT DATE (DD-MM-11)		DATES COVERED (From - 10)	
October 2001	Final		06/01/1994 - 07/29/1999
4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER		
FUEL AND FUEL SYSTEM MAT	ERIALS COMPATIBILITY T	TEST	F33615-92-C-2207
PROGRAM FOR A JP-8 +100 FUI	EL ADDITIVE		5b. GRANT NUMBER
Volume 1: Thermal Stability Addit	ive Package BetzDearborn Spec	Aid® 8Q46	2 5c. PROGRAM ELEMENT NUMBER
(Supercedes AFRL-PR-WP-TR-200	00-2021)		62203F
6. AUTHOR(S)			5d. PROJECT NUMBER
Dexter Kalt, Marlin Vangsness, Ber	njamin Wilt, Susan Saliba, and	John Dues	3048
(UDRI)			5e. TASK NUMBER
Alan Fletcher and Larry Perkins (A	FRL/MLSA)		05
Steven Anderson (AFRL/PRTG)			5f. WORK UNIT NUMBER
			AH
7. PERFORMING ORGANIZATION NAME(S) AI	ND ADDRESS(ES)		8. PERFORMING ORGANIZATION REPORT NUMBER
University of Dayton Research Inst 300 College Park	itute AFRL/MLS	SA	UDR-TR-97-01A
Dayton, Ohio 45469-0001	AFRL/PRT	G	
SPONSORING/MONITORING AGENCY NAM Propulsion Directorate	10. SPONSORING/MONITORING AGENCY ACRONYM(S)		
Air Force Research Laboratory	AFRL/PRTG		
Air Force Materiel Command Wright-Patterson Air Force Base, C	11. SPONSORING/MONITORING AGENCY REPORT NUMBER(S) AFRL-PR-WP-TR-2000-2015		

12. DISTRIBUTION/AVAILABILITY STATEMENT

Approved for public release; distribution is unlimited. (ASC-03-0531)

13. SUPPLEMENTARY NOTES

Report contains color. Much of the report is a series of tables that contain test data.

Work was also performed on this project under Contract number F33615-97-C-2719 (JON 304804AM).

(Supercedes AFRL-PR-WP-TR-2000-2021.)

14. ABSTRACT

(Supercedes AFRL-PR-WP-TR-2000-2021.)

This report describes a program inaugurated to test the compatibility of aircraft fuel system materials with a JP-8 fuel containing a new thermal stability additive (TSA) package. The JP-8 fuel containing this new TSA is commonly referred to as JP-8 +100. (The "+100" refers to the expected 100 °F increase in thermal stability range of fuel containing the additive over the thermal stability range of JP-8 fuel.) In this test report, the effects of fuel containing BetzDearborn - 8Q462 TSA (JP-8 +100) in normal and x 4 concentrations levels on over 222 different aircraft fuel systems materials are measured in comparison to the effects of JP-8 fuel on the same materials. The BetzDearborn - 8Q462 fuel additive package incorporates a dispersant/detergent, a metal deactivator and an antioxidant compound which reduces the rate of oxidation and deterioration of fuel at higher temperatures.

Within airframe and engine fuel systems and fuel storage and handling equipment, materials including metallics, elastomerics, composites and other nonmetallics are found in contact with aviation fuel. This report describes many of these materials and physical property changes observed in these materials after thermal aging in aviation fuel containing the BetzDearborn - 8Q462 TSA package in laboratory experiments.

15. SUBJECT TERMS

Jet fuel, JP-8, physical property measurements, compatibility, thermal stability additive package, fuel/material aging

16. SECURITY	CLASSIFICATIO	N OF:	17. LIMITATION	18. NUMBER	19a.	NAME OF RESPONSIBLE PERSON (Monitor)
a. REPORT Unclassified		c. THIS PAGE Unclassified	OF ABSTRACT: SAR	OF PAGES 388	19b.	Robert W. Morris TELEPHONE NUMBER (Include Area Code) (937) 255-3527

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REVIEW AND COORDINATION

The data and text contained in this report have been reviewed and the results, conclusions and recommendations agreed to as below:

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ABSTRACT

This report describes a program inaugurated to test the compatibility of aircraft fuel system materials with a JP-8 fuel containing a new thermal stability additive (TSA) package. The JP-8 fuel containing this new TSA is commonly referred to as JP-8 + 100. (The "+100" refers to the expected 100 °F increase in thermal stability range of fuel containing the additive over the thermal stability range of JP-8 fuel.) In this test report, the effects of fuel containing Betz/Dearborn SpecAid® 8Q462 TSA (JP-8 + 100) in normal and (x) 4 concentration levels on over 222 different aircraft fuel systems materials are measured in comparison to the effects of JP-8 fuel on the same materials. The Betz/Dearborn - 8Q462 fuel additive package incorporates a dispersant / detergent, a metal deactivator and an antioxidant compound which reduces the rate of oxidation and deterioration of fuel at higher temperatures.

Within airframe and engine fuel systems, materials including metallics, elastomerics, composites and other non-metallics are found in contact with aviation fuel. This report describes many of these materials and physical property changes observed in these materials after thermal aging in aviation fuel containing the Betz/Dearborn SpecAid® 8Q462 TSA package in laboratory experiments. These changes are evaluated in comparison to: 1) physical properties of materials aged in a JP-8 baseline fuel; and 2) physical properties of materials before fuel aging. The tests were designed to replicate temperatures to which the materials and the specific fuels would be subjected in airframes and engines. Two challenges existed in designing the tests. The first challenge was designating a concise test period so that testing of a large number and wide variety of materials could be completed within a moderate amount of time. An additional challenge was choosing a test period long enough that the results could be judged to be meaningful, i.e. to reasonably replicate "real world", in situ, use of the materials. A 28 day thermal aging period (with 7 day fuel change out) was selected as a manageable test period, i.e., practical for completing several test thermal stability additives while allowing sufficient time to observe the thermal degradation of the material over that test duration.

The test materials represent the following use categories: 1) aircraft fuel systems; 2) ground servicing and containment equipment; and 3) storage vessels. The aircraft materials include those used in fuel system tanks and in associated components (pumps, fuel lines, connectors, sealants, locking devices) as well as metallic alloys used in fuel lines and engine components up to the combustion chamber. The testing centered on the degradation of the physical properties of the materials. In some cases, the materials' effect on the fuel, e.g., conductivity, gums, acid number and hydroperoxides also is reported. For metallic materials, the concentration in the fuel of the specific elements present in the alloy are measured after thermal aging.

Early in the program, two objectives were identified. The first was to determine whether the new TSA would be compatible with fuel system and engine materials in the higher temperature fuel environments projected for a new generation of aircraft. The second was to determine whether the new TSA would be compatible with fuel system and engine materials in the (presumably) lower fuel temperatures of aircraft in current inventory.

ACKNOWLEDGMENTS

Susan Saliba, UDRI Non-metallic testing and evaluations at the Benjamin Wilt, Engineer, UDRI Kettering Laboratory, UDRI campus John Dues, Technician, UDRI Dayton, OH John Conner, Technician, UDRI Tom Dafler, Technician, UDRI Arthur (Skip) Behme, Technician, UDRI Metallic and non-metallic testing at Mark Farmer, Technician, UDRI B-490, WPAFB, OH Greg Hartman, Technician, UDRI Fuel sample test evaluation support at Becky Grinstead, Chemist, UDRI B-490 WPAFB, OH Costandy Saba, Engineer, UDRI Marlin Vangsness, Engineer, UDRI Tim Mudry, Technician, SA-ALC (USAF) B-70 WPAFB, OH Joseph Leone, Engineer, UTC All Metallic material evaluations, Larry Perkins, Engineer, AFRL/MLSA (USAF) data preparation and recording at B- 652 WPAFB, OH Alan Fletcher, Engineer, AFRL/MLSA (USAF) Non-metallic material evaluations at B-652 WPAFB. OH Steve Anderson, Chemist, AFRL/PRSF (USAF) Fuel additive preparation, fuel evaluations at B-490, WPAFB, OH Brian Bergstem, Engineer, UTC Data preparation and recording James Shardo, Technician, UDRI Design, fabrication & electrical installation

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APPRECIATION

The depth and breadth of this program required the formal participation and cooperation of many individuals from differing disciplines and organizations. In addition, advice was solicited from a wide variety of other sources. The knowledgeable inputs of these individuals was invaluable. Their generosity in reviewing test results, offering the benefits of their experience, critiquing, advising and supporting this effort have helped to make this program possible. Special mention must be made of the unselfish support provided by Alan Fletcher, Joe Leone, Larry Perkins, John Dues, Benjamin Wilt and Arthur (Skip) Behme. The kind guidance and assistance of Steve Anderson, William Harrison, Dr. Ival Salyer, Robert Kauffman, Robert Morris, Edward Binns, Ellen Strobel, Marlin Vangsness and Dr's Shawn Heneghan and Dilip Ballal are gratefully acknowledged.

The gathering of test materials for this effort represented a monumental assignment in investigation of fuel systems, identification of materials and acquisition of appropriate test samples. The cooperation and generosity of airframe and hardware manufacturers eased the task considerably. They include: Pratt & Whitney, General Electric, Argo-Tech, Deleval (Wiggans), XAR Industries, Auto Valve, The Boeing Company (military and commercial, Wichita/Seattle/Everett), McDonnell Douglas St. Louis, Lockheed Aircraft Company, J. C. Carter Co., Allied Signal Aerospace (Bendix), Rolls Royce, Shaw Aero Devices, SAE AE-5 Committee, Parker Hannifin Co., The Crest Co., Foamex Co., H. R. Textron Inc., B.F. Goodrich, Ragan Data Systems, Green Tweed, Parker Seal, DuPont, Engineered Fabrics, Amfuel and Durodyne Inc.

This work was supported by the United States Air Force under Contract No. F33615-92-C-2207 with Mr. Charles Frayne serving as the contract monitor.

EXECUTIVE SUMMARY

OBJECTIVE

(Supercedes AFRL-PR-WP-TR-2000-2021.)

The objective of this evaluation is to determine by *comparative* thermal aging tests and analyses whether a thermal stability additive package in JP-8 fuel deteriorates the contacted fuel system materials to the extent that there is any significant degraded system performance as compared to the currently used JP-8 fuel.

SCOPE

The scope of this report includes an examination of the compatibility effects of the thermal stability fuel additive on certain fuel system materials and illustrations of the critical importance of the material use and selection criteria for fuel system materials which experience the temperature variances of the air vehicle environment. The Air Force inventory includes an extensive number of both older and newer aircraft types and models. More than two hundred twenty-two materials which come in contact with fuel have been identified for the evaluation.

METHODS

The current methods for evaluating materials which come in contact with fuel are generally separated into two basic categories: a) methods used for evaluating metallics; and b) methods used for evaluating non-metallics. Physical properties such as tensile, elongation, hardness, volume swell, compression set, etc. are typical criteria for evaluating the integrity of elastomeric materials after thermal aging in fuel. Physical properties such as weight change and corrosion are typical for evaluating the condition of metallic materials after thermal aging in fuel. The tests were conducted with small representative material coupons and with the materials being static (in a free state) i.e. in a non-component system application. The static (free state) thermal aging tests of the materials which come in contact with fuel provide a practical method of comparing the thermal stability additized test fuel (JP-8 + 100) results to a control JP-8 fuel results. To further complement this testing, a JP-8 fuel with the thermal stability additive 4x concentration provides additional data for trend observations and any impact of accidental over-concentration of the thermal stability additive. (The 4x concentration applies only to the detergent/dispersant component in the additive package.) ASTM D4054 and D-2-1137 requires the evaluation results to be based on a 4x fuel additive concentration as compared to the baseline JP-8 test results.

In addition to changes to the physical properties of the materials, selected fuel properties were measured that might be influenced by material deterioration and corrosion. Fuel properties examined after thermal aging included acid number, gums, hydroperoxides, conductivity and elemental analysis.

EVALUATION CRITERIA

The evaluation criteria established for each material are based on direct comparisons of test results using: 1) normal concentration of thermal stability additive (TSA) in the test fuel; 2) 4x concentrations of TSA in the test fuel; and 3) JP-8 fuel (the control fuel). The TSA fuel test results were required to be equal to or better than the JP-8 test results. When test fuel / non-metallic test results were below the JP-8 non-metallic test results, a second comparison was made using developed acceptable tolerances. These acceptable tolerances were developed by applying experience and judgment in a case by case scenario.

TEST RESULTS

The <u>Betz/Dearborn (SpecAidâ 8Q462)</u> thermal stability fuel additive does not significantly degrade any of the materials tested based on the static test results evaluated. The summary table (Section VIII) of this report highlights the results of those materials tested and evaluated.

Materials were aged at test temperatures in TSA fuels and in JP-8 control fuel. Test results were examined and compared. A selection of materials that failed, were re-tested at lower temperatures. An assessment was made of the comparative effects of TSA fuels and JP-8 control fuel on the materials' properties.

When, in examining the test data, it was determined that out-of-specification/tolerance results were the result of higher test (fuel) temperatures, an OT (over temperature) evaluation was used to identify that test result. Consequently, materials which exhibited acceptable results in lower temperatures but unacceptable results in higher temperatures were identified. The OT designation allows the test data to be useful in determining acceptability of the TSA on two different applications: 1) new generation aircraft that may generate higher fuel temperatures; and 2) aircraft in the current inventory where comparatively lower fuel temperatures are experienced.

Betz/Dearborn additive (SpecAid® 8Q462) was judged to be acceptable with those materials tested.

ADDITIONAL TESTING

While the evaluation of materials in a static state (non-component system application) are valuable, appropriate and necessary, they may not predict material performance in an actual aircraft application. For example, degradation in a physical property and/or corrosion which ultimately results in fuel leakage and/or component malfunction may not be evident in a laboratory test. The correlation between static (free state) aging and performance in an actual aircraft component is a part of the overall program evaluation. A flowing test rig has been constructed to test materials in their component and sub-assembly applications i.e. in the configuration in which they are used in actual aircraft. These tests will complement the static tests by introducing some of the mechanical factors and elemental interaction factors of the actual aircraft component / fuel flow system application. In addition, the practical impact of the materials' physical property static test results can be observed, e.g., whether compression set to a given measurement causes the component to leak.

The test and evaluation of all these materials in *all* dynamic applications is impractical. Consequently, the materials to be tested in their applications are selected based on the static test results. Dynamic fuel flow test results currently are underway. Those tests are incomplete at this reporting and will be a part of a future report.

ADDITIONAL REPORTING

The metallic microscopic tests / evaluations used to assist this evaluation are too extensive to be included in this report. That work will be published in an AFRL/MLSA report.

I. BACKGROUND

A. GENERAL

History

Fuel temperatures in high performance aircraft are increasing as a result of using the aircraft bulk fuel as a heat sink to cool aircraft sub-systems. Higher thermal stability fuels are available; however, the cost has been prohibitive for a wide usage fuel such as JP-8. The use of an additive which would increase the JP-8 thermal stability by up to 100°F at a fraction of the cost of high thermal stability fuels such as JP-7 and JP-TS could be of great benefit to the Air Force and to future aircraft designers. Increased thermal stability of fuel through incorporation of an additive at very low concentrations (parts per million) should also result in benefits to existing aircraft which have experienced engine coking problems with the introduction of JP-8 fuel.

Test Program Development

This program was initiated on the heels of the higher acid number fuel material evaluation. Some refineries in Alaska had requested a deviation from the fuel acid number in the specifications while they were producing both JP-4 and JP-8 as they changed from JP-4 to JP-8 production. A material compatibility test program was conducted to determine whether such a temporary deviation could be allowed for JP-8. Some of the ground work established for that evaluation was adopted for this program. A 28 day aging test period and an airframe fuel system temperature of 160°F was selected for that program. This test temperature is an increase over the 140°F standard temperature for most previous fuel system material tests. A task to identify a comprehensive material list and appropriate test temperatures was also initiated in view of the anticipated thermal stability additive program.

Prior to the initiation of the thermal stability additive package materials evaluation, several weeks of development tests were conducted. It was necessary to establish a method of evaluating a large number of materials at elevated temperatures up to 400°F for aging periods of 28 days with a minimum number of fuel change-outs. A schedule of fresh fuel changes (initial fuel and three changes-outs) one/week during the 28 day test was considered an acceptable and reasonable goal that did not incur a major program schedule impact.

Fuel deterioration was a primary concern over the sustained period of time under static temperatures of 325°F and up to 400°F. (Severe degradation may interfere with the ability to draw conclusions on the additives' impact on a material.) Fuel color was used as a qualitative method of judging the fuel after 7 days at a sustained high temperature. An initial temperature of 325°F resulted in a fuel color change similar to that of simulated aircraft recirculated engine fuel test rig results (light amber). Experiments indicated that the factors that affected fuel color (an indicator for fuel deterioration) were: a) pressure; b) limiting introduction of oxygen / air; c) thermal cycling; and d) inclusion in the test chamber of an open container of fuel-soaked sand.

Early tests were conducted in a closed pressure vessel with no positive or negative pressure applied. However, the sealed fuel container heated within the closed pressure vessel developed pressure changes (fuel expansion) during the test period. At the conclusion of each test heat cycle, the return to ambient temperature caused the seals to be broken on some fuel test containers allowing introduction of air. It was learned that maintaining ambient pressure by venting the pressure vessel during the test aided in maintaining the seal integrity of the test fuel containers and helped to protect the fuel from deterioration. Thermal cycling also resulted in oxygen / air introduction into the test containers. Thermal cycling of the fuel may be caused by oven or pressure vessel power outages. An open container of fuel soaked sand placed within the pressure vessel proved to be a necessary agent in maintaining test fuel integrity.

Minimizing oxygen introduction into the fuel / material container successfully maintained fuel at a light amber color at 325°F, and preliminary tests at 365°F provided a reasonable indication that the fuel could retain a light amber color at 400°F temperatures. Those techniques which minimized oxygen introduction into the fuel / material container thus minimizing fuel deterioration were documented and used throughout the program.

Fuel exposure to air at elevated temperatures for a long period of time will result in the formation of corrosive materials (peroxides, aldehydes, ketones, acids, etc.) at levels far greater than routinely seen in an aircraft. Fuel autoxidation was controlled in these experiments (control autoxidation) to levels similar to those found on aircraft under recirculated conditions.

Test Hardware Selection

Stainless steel pressure vessels equipped with exterior heating jackets were selected as test chambers for 250°F to 400°F tests. The pressure vessels were maintained in an unpressurized condition and vented to the test cell low pressure vent. The pressure vessel structural integrity was also protected with a pressure relief valve. Ovens were generally used for fuel temperatures of 225°F or less.

Later in the program, in order to increase the number of material tests at 325°F, a new larger oven was equipped with a fuel containment insert to insure fuel / vapors did not come in contact with the oven heating coils. A nitrogen blanket was maintained by bleeding nitrogen around the oven interior continuously throughout the test. This provided a slight positive pressure exterior to the fuel containment insert to avoid any possibility of fuel / vapor leaks onto the oven heating coils.

The ovens and pressure vessels were protected against over-temperatures with temperature controllers. Generally, these were set 15°F higher than the test temperature. The test containers (capped jars containing materials and fuels) and fuel soaked sand in an open tempered glass container were placed in the pressure vessels and ovens.

Tempered glass jars were selected to hold the test material samples and the test fuel in which they were immersed. Rounds cut from thin (0.01"), rigid Teflon sheet to the exact dimensions of the tops of the jars were used as covers and held in place with standard jar rings. The Teflon seal expanded and contracted as vapor pressure changes occurred while maintaining the jar seal, minimizing air / oxygen entry into the fuel. Most non-metallic materials tests conducted at 200° F and lower were conducted by UDRI personnel on campus at the Kettering Laboratories. They used aluminum foil as a seal in lieu of thin Teflon.

Fuel System Test Materials Identification

The fuel system test materials identified and selected for this test were those which come in contact with fuel on a continuous basis. Materials which may only be wetted inadvertently and on a limited, intermittent basis were not included in this test program due to the absence of validated test methods and the absence of baseline fuel data. Aircraft airframe and engine fuel systems and refueling equipment are the primary sources of test material identification. These materials are found in aircraft fuel containment fuel system components and lines up through the engine fuel nozzles and combustion chamber as well as the aircraft ground and aerial refueling systems. Due to the potentially wide use of JP-8 + 100, it was necessary to consider materials from current and future aircraft. In view of having a standard battlefield fuel and aerial refueling tanker operations involving both the intra-service and international communities, all military aircraft fuel system materials are potentially impacted by this program. As a result of this potential, a wide scope investigation for fuel system material identity was pursued. The Society of Automotive Engineers (SAE) / AE-5 committee, airframe / engine manufacturers, DoD personnel and fuel system component manufacturers were contacted to assist in identifying fuel system materials. The original list of fewer than thirty materials grew to 222 materials, including 90 metallics and 132 non-metallics. Some of these materials may be located on both the lower airframe temperature range, 160°F to 225°F, and on the engine with temperature ranges from 250°F to 400°F.

Material Selection Criteria

In some cases, listed materials were not tested. These materials are designated in the summary chart as NT (no test planned). These materials may be found in aircraft and/or ground refueling (storage handling systems), but were not tested for the following reasons:

- 1. material did not represent the worst case (less likely to be adversely affected by the fuel/temperature aging process than other, similar materials that were tested)
- 2. material was no longer available or in production;
- 3. neither the material nor source could be identified. However, in many cases, a similar material (same family of materials) was tested and evaluated;
- 4. material was similar in chemical composition to another material that was tested;
- 5. materials mentioned in this report which are associated with a component or special test configuration will be tested and the results included in a separate report covering fuel system components application fuel flow test stand results. That report may include such items as fuel quantity gauging systems probes / electronics, fuel "O" rings, engine fuel pump bearings, etc. This testing is intended to establish a correlation between static test results and component application of the materials, primarily with JP-8 fuel, and is not intended as part of the TSA evaluations.

Test Temperature Identification

Two primary test temperatures were selected for this material compatibility test program. An airframe temperature of 200°F was chosen since engine fuel recirculation back to the airframe fuel tanks is likely on new high performance aircraft. A temperature up to 325°F is currently experienced by many aircraft engine and associated fuel system component materials. Other test temperatures were evaluated when materials were unable to sustain the higher temperatures; i.e. 275 / 250 / 180 / 160°F. A 400°F temperature was evaluated when a material exhibited successful compatibility at 325°F and the material could likely be used in a higher temperature environment.

Test Duration Identification

A test duration of 28 days was considered the most practical to assess such a large number of materials. Some early evaluations accomplished at 7 days indicated significant material property changes. Some of this 7 day data is included in the data sheets to illustrate material property changes between the 7 and 28 day periods. The correlation of 28 days static material exposure tests at a specific temperature to an actual aircraft fuel system component environment has not been established. However, the results of this test are primarily intended as a comparison of fuels with and without a thermal stability additive package and any negative or positive effects of that additive package. Material temperature limitations at a specified test duration also may be gleaned from the test results.

B. MATERIALS The materials selected for this evaluation were grouped in the following categories and assigned an Test Plan Identification number:

Test Plan Identification Numbers beginning with "I." Generally Represent Airframe Use

Test Plan Identification Numbers beginning with "II." Generally Represent Engine Use

The following identifies categories of materials with the identification numbering system employed for these tests:

1. P	A. Ad	lhesives	I.I.	Electrical	Wire I	nsulation/Misc.

I.B. Bladder Tanks I.J. Joining Materials (Welding, Brazing)

I.C. Coatings (tanks)

I.K. Miscellaneous Coatings, Name Plates,
Bearings, Surface Lubricants

I.D. Sealants (tanks) I.L. Locking Compounds

I.E. Composites I.M. Metallics (Airframe)

I.F. Filters / Foams II.M. Metallics (Engine)

I.G. Gaskets ("O" rings) Airframe I.O. Floats (Level Control Valves)

II.G. Gaskets ("O" rings) Engine I.P. Potting Compounds (Electrical Connectors)

I.H. Hoses (Ground and Aerial Refueling)

C. CONTROL AND TEST FUELS

For this materials compatibility test program, Jet A fuels were used as the baseline / control fuels and also as the fuel for the thermal stability additives. The Air Force identifies each fuel by an identification number. The numbers for the fuels selected for this evaluation are 93-POSF-2980 and 92-POSF-2926. Both fuels met the specification requirements of ASTM D1655. The 93-POSF-2980 is a Merox treated fuel. The 92-POSF-2926 is a hydro treated fuel which oxidizes at a greater rate than the 93-POSF-2980 fuel. All Jet A fuel was converted to JP-8 by incorporating JP-8 additives. These additives included an icing inhibitor, Diegme, 0.12 volume %; a corrosion inhibitor, 15 mg/l; and a static dissipater, Stadis 450, 2 mg/l. Although testing of the fuel for conductivity indicates that in many cases the fuel did not meet the minimum of 150 pS/m, absolute conductivity of the fuel was not considered critical. Rather, maintaining the same amount of Stadis 450 in all test fuels was considered critical.

All the materials designated I.M, II.M, I.J, I.K. and I.O were tested with 93-POSF-2980 1994 through December '96. The non-metallics were tested with 93-POSF-2980 with the exception that the baseline control fuel materials after May 1995 were tested with 92-POSF-2926. All testing after Dec '96 was accomplished with 92-POSF-2926 fuel, since the Air Force 93-POSF-2980 supply of Jet A fuel had been depleted. Fuel property measurements for acids, hydroperoxides and gums were accomplished early on for several materials to determine whether any correlation existed between these fuel properties changes and material degradation.

D. TEST FUEL ADDITIVES

The thermal stability additive test package for this program was provided by the Betz/Dearborn Company. The additive is identified as SpecAid® 8Q462. This thermal stability additive package includes a dispersant/detergent (d/d), a metal deactivator (MDA) and an anti-oxidant (BHT). The metal deactivator (MDA) additive is the conventional chemistry, N,N-disalicylidene-1,2 - propane diamine, currently approved for both commercial and military jet fuel. For the purposes of this test program, the MDA was used @ 10 mg/l. The antioxidant used was BHT at a concentration of 25 mg/l. The detergent/dispersant was used at 100 mg/l for normal concentration and 400 mg/l for 4x. Normal concentrations are 100 mg/l d/d and 25 mg/l BHT and 10 mg/l MDA. The 4x concentrations are 400 mg/l d/d and 25 mg/l BHT and 10 mg/l MDA.

For this test program report, Volume I, only the Betz/Dearborn SpecAid® 8Q462 additive is evaluated and reported. Additional reports and special component application tests will be published for each JP-8 +100 thermal stability additive package evaluated.

During this program, the Betz/Dearborn SpecAid® 8Q462 thermal stability additive package was evaluated at two concentrations: 1) normal concentration and 2) 4x concentration. The MDA and BHT concentrations remained constant for the Betz 8Q462 additive. In the text, data pages and supporting documents of this report, "Betz" (excepting references to the additive manufacturer), "BetzDearborn" and "Betz TSA" as applied to a fuel or fuel additive shall be construed to represent fuel containing BetzDearborn SpecAidâ 8Q462 or the BetzDearborn SpecAidâ 8Q462 additive itself. The context of the usage will provide a clear distinction between fuel and fuel additive.

Most testing involved: 1) a baseline JP-8 fuel as a control, 2) JP-8 \pm 100 (with thermal stability additive package in normal concentrations), 3) and JP-8 \pm 100 4x (with detergent/dispersant additive at four times normal concentrations).

E. TEST EQUIPMENT / PROCEDURES

The test equipment for higher temperature evaluations (325°F - 400°F) consisted of 4 pressure vessels with heating jackets, programmable digital temperature controllers and separate over-temperature controllers. The test system was designed and assembled by the UDRI personnel, as shown in Figure # 1. These pressure vessels are designed for safe operation over 400°F. The vessels were fitted with a removable flat shelf for accommodating six quart-size jars around the circumference and one in the center (filled with fuel-soaked sand) for a total of seven jars (See Figure # 2) Ovens at the University of Dayton Kettering Laboratories and WPAFB B-490 also were utilized to accommodate lower temperature fuel tests i.e. 225°F and lower. One environmental chamber equipped with a specially designed fuel/vapor isolation insert in the fuel/materials laboratory, B-490 WPAFB, was utilized for testing up to 325°F. With this modification, the oven could accommodate considerably more test materials than the pressure vessels (See Figure # 3.)

Non-metallic test samples were placed and/or suspended in approximately 700 ml of fuel in Teflon-sealed (or aluminum foil capped), quart canning jars. (See Figure # 4, illustration of "O" - rings suspended and compression set fixtures.) The samples were marked for identification with silver pencils. Generally, five test samples were used for non-metallic materials. An average of the five test sample readings was calculated and reported. An exception was the compression set data for "O" rings which involved two specimens. With some materials, only one test specimen (data point) was required e.g. foam resistivity.

Metallic material test samples were placed in separate 30 ml beakers and marked with sample identification information. In most tests, the metallic test coupons were 1" x 2" x 0.063" specimens. Three test specimens (placed in separate, marked beakers) of a given material generally were used in this test. The beakers were placed inside Teflon-capped, quart jars with 700 ml of fuel. Weight measurements of the samples were made before and after the 28 day test period. The average weight of the three test samples was calculated and reported. (See Figure # 5) A test iteration for metallics included a total of ten (10) specimens, three specimens of a given material in each of the three test fuels, and one specimen as a control (new) material. The four pressure vessels could accommodate eight materials to be tested simultaneously. (Two different materials per pressure vessel.)

F. MATERIAL / FUEL PROPERTY TESTS

1. Non-Metallic Property Tests

Non-metallic material properties are measured to evaluate the materials' ability to perform in component applications. Due to the magnitude of this test program, only a limited number of properties could be evaluated for each material. Those key properties that could give easy identification of degradation were selected for each type of material. These properties were measured for the new, unstressed material samples (control materials) and thermally aged materials. The thermally aged material samples were exposed to the following fuels: 1) the control fuel (JP-8); 2) JP-8 +100; and 3) in JP-8 +100 4x. The material properties after 28 day aging in JP-8 +100 and in JP-8 +100 4x were compared to its properties after 28 day aging in the JP-8 control and to the properties of new, unstressed material samples. Any negative / positive effects of the +100 additive were noted. Material specifications were reviewed and used to help establish allowable limits for changes in material properties.

<u>Selection of Test Methods</u> The tests selected were designed to give an indication of material degradation with a minimal amount of testing. Tests of common physical properties of the materials related to the degradation of the function of the materials were selected. For example, for coatings, pencil hardness was selected as an easy test that demonstrated whether the additive weakened the coating. For "O" rings, tensile/elongation, volume change, hardness and compression set were chosen as indicators of degradation.

Table 1. lists the physical properties chosen for evaluation of the materials' condition after thermal aging.

TABLE 1.

2. Material/Physical Properties Test Methods

CATEGORY IDENTITY	<u>MATERIAL</u>	PHYSICAL PROPERTIES
I.A.	Adhesives	Lap Shear, Cohesive
I.B.	Bladders	Tensile / Elongation / Volume Swell
I.C.	Coatings	Pencil Hardness / Tape Adhesion
I.C. / I.D.	Coatings / Sealants	Tensile / Elongation / Volume Swell / Shore A Hardness / Peel Strength / Cohesion
I.D.	Sealants (non-curing)	Rupture Pressure / Volume Swell
I.E.	Composites	Inner Laminar Shear
I.F.	Foam (ESM)	Tensile / Elongation / Resistivity
I.G./ II.G.	Gaskets ("O" Rings)	Tensile / Elongation / Volume Swell / Shore Hardness / Compression Set
I.H.	Hoses	Tensile / Elongation / Volume Swell / Shore A Hardness
I.I.	Electrical Wire	
	Insulation (Film)	
	a) filmb) wire	a) Tensile / Elongationb) Wet Dielectric
I.K.	Miscellaneous	Visual Observations and Other
I.L.	Locking Compounds	Torque
I.O.	Floats	Float Ability / Visual Observations
I.P.	Potting Compounds	
	a) epoxyb) film/slab	a) Lap Shear / Cohesionb) Tensile, Elongation, Volume Swell, Hardness, Peel Strength, Cohesion
	c) connector	c) Insulation Resistance

The preceding physical property tests, material preparation and test procedures generally were accomplished in accordance with MIL-HDBK-149B and the following specifications and military guidance documents:

<u>TEST</u>	<u>SPECIFICATION / DOCUMENT</u>		
Tensile / Flongation	ΔSTM D-1414 (Type I / O Rings		

Tensile / Elongation ASTM D-1414 (Type I / O Rings)

ASTM D-412 Type II
Compression Set
ASTM D-395 (Method B)
Hardness (Pencil)
ASTM D-2240, D3363

Volume Swell ASTM D-471
Tear Resistance ASTM D-624
Resistivity ASTM D-257-O

Tape Adhesion/Cohesion Fed. Std. 1418 (Method 6301)

Laminar ShearASTM D-790Peel Strength/CohesionSAE AS 5172Lap ShearASTM D-1002HardnessASTM D-2240TorqueMIL-S-22473Pressure RuptureMIL-S-85334Laminar ShearASTM D-790

Alaska Tape Test Fed Test Std. 141 (Method 6301

Tabor Test ASTM D1044

Bubble Point (in. H₂0) MIL-F-8815, SAE/ARP 901

Wet Dielectric (uA) SAE AS 4373

3. Metallic Property Tests

The metallic specimens were evaluated in terms of corrosion. Weight gain or loss and pitting were the primary methods of evaluation. Optical microscopic evaluation to 50X was performed to evaluate color changes and pit area and depth. Scanning electron microscopy was used to characterize pit morphology and analyze for elemental constituents using energy dispersive x-ray spectroscopy (EDS). If warranted, cross-sections of samples were prepared to thoroughly evaluate the corrosion mechanisms (i.e. intergranular, selective leaching and exfoliation). Comparisons were made between the control JP-8, JP-8 + 100 and JP-8 + 100 4x concentrations on the alloys evaluated during thermal exposure. Based on the results, mechanical testing was not warranted. Pitting evaluation and uniform corrosion (weight loss) were found to be the most reliable means for determining the effect of the additive on the alloys tested. Welded, brazed and soldered assemblies simulating standard manufacturing techniques were included in the tests. *This evaluation did not assess the effect of the JP-8 control fuel and its associated normal (exclusive of the thermal stability additive) additives on the alloys tested.* The evaluations were performed in accordance with standard industry practice including the following specifications.

<u>TEST</u>	<u>Specification</u>
SCC	ASTM-945
Weight loss/gain	ASTM-483
Cleaning	ASTM G1
Pitting evaluation	ASTM G46

4. Material Physical Properties Test Methods and Descriptions

- 1. Tensile strength (psi) may be defined as the resistance of a material to a force tending to tear it apart. The lbs. per square inch force at maximum breaking strength is reported. All materials were tested on a power driven test machine at a grip separation rate of 20"/min. O-rings were tested using 1/2-inch spindle grips, sealants, and film materials were evaluated using die C specimens. ASTM D 412 was the specification used.
- 2. % Elongation may be defined as a measure of growth in length of a material prior to breaking; reported as a percent of the original length. The elongation of all materials was measured using a video extensometer measuring gage marks on the specimen.
- 3. % Volume Swell may be defined as the amount a material swells when exposed to a fluid. % volume swell is the difference between the weight in air (w3) minus the weight in water (w4) after conditioning minus the difference between the wt in air (w1) minus the wt in water (w2) before conditioning divided by the difference between the weight in air minus the weight in water before aging times 100.

$$\frac{(w_3 - w_4) - (w_1 - w_2)}{(w_1 - w_2)} \quad x \quad 100$$

- 4. Hardness: Shore A)- Hardness is the amount of force needed to cause a fixed amount of indentation with an elastomer. ASTM D 2240-97 is the specification method.
 - Pencil Hardness: A coating is scratched at a 45° angle with a pencil lead that is perfectly square. The hardness is the hardest lead that will not cut the coating. The procedure followed is in ASTM 3363.
- 5. Compression Set may be defined as the amount of elastic force remaining after a material has been compressed and then released. Cut o-rings are placed between two chrome-plated plates and compressed to 75% of their original thickness. After conditioning the o-rings are released and re-measured after setting out for 30 minutes ASTM-D-1414 is the procedure followed:

original thickness - t_o final thickness - t_i space bar thickness - t_n

$$C_s = \frac{(t_0 - t_i)}{(t_0 - t_n)} \times 100$$

- 6. Lap Shear: the force required to slide a bond apart. Two plates are bonded together, fluid immersed and then pulled apart in shear. 2024 T3 aluminum 1" wide with 1/2 inch overlaps were used to evaluate the adhesives. The specimens were pulled apart at a .05 inch crosshead speed.
- 7. Cohesion (%): Cohesion is the measure of the materials ability to adhere to a given substrate. The higher the % cohesive failure, the better the material adhered to the substrate with 100% cohesive failures being perfect. One hundred percent cohesion means that the bond of the adhesive or sealant to the panels is stronger than its own internal strength. This is used for the evaluation of adhesives and fuel tank sealants.

- 8. Peel strength (lb/inch): a measure of the adhesive strength of a sealant. Fuel tank sealants are laid on a solid substrate with a flexible member imbedded in the sealant. The flexible member is then pulled at a 180-degree angle to evaluate the load necessary to tear the sealant.
- 9. Laminar Shear: the shear force required to break a composite. Flexure loading of a composite material in four-point loading at a test speed of .05 inches/min. The procedure followed is ASTM-D-2344-84.
- 10. Resistivity: The resistance to electrical current was measured by placing a 1 inch thick by 12 inch diameter foam specimen between two electrodes. The mehgometer (the instrument for measuring resistance) was set to 500 volts and the resistance was measured.

$$ev = \frac{\text{measured resistance x 155.7 cms}^2}{\text{sample thickness x 2.54 cm/in.}}$$

- 11. Torque: The amount of force needed to break the bond between a bolt and nut that were bonded together with Locktite.
- 12. Wet Dielectric is a measure of electrical conductivity. Wires are soaked in a 5% NaCl in water solution for one minute at 1500 VRMS AC 60 Hz using Hi potronics HD 125 high-pot tester.
- 13. Wet Adhesion describes the adhesion of a coating to a substrate. Two parallel lines were scribed 1 inch apart in the panels coated surface down to the metal. A piece of tape, 3M's 250 was laid across the lines and peeled at 180 degrees. The procedure followed is ASTM-D-3359.
- 14. Taber Abrasion: a measure of the wear resistance of a material. A wheel of known hardness and weight is laid on the surface of a coated panel. The panel is run in a circular pattern beneath the wheel for a number of cycles and the weight loss is calibrated.
- 15. Rupture Pressure is a measure of the resistance of a sealant to pressure. The sealing compound is packed in a hole on a blow out specimen, mounted in a pressure rupture fixture and air pressure is applied until the sealing compound fails. This test is run per MIL-P-85334.
- 16. Bubble point: This test method is a procedure for measuring the largest pore or hole in a fuel filter. The filter is immersed in a test liquid which wets and saturates the filter port structure. Gas pressure is applied to one side of the porous wall so that the liquid phase which wets the pores is displaced by the gas. The gas pressure is increased until a steady stream of bubbles is emitted from a point on the porous surface. This test is run IAW SAE ARP 901, and the reported measurement is in inches of water.
- 17. Ballistic Puncture Test for self sealing fuel bladder. A test was developed for evaluating the self-sealing bladder materials by comparing JP-8 fuel to TSA fuel test results. This test consisted of puncturing bladder (12" x 12") specimens by shooting them with a 50 caliber bullet. A 12" x 12" specimen was then placed into a permeability cup with the JP-8 fuel and a permeability cup with the TSA Betz fuel in normal concentration. A fuel seal of the puncture (no fuel leakage) without pressure was considered acceptable.

5. Fuel Property Tests

Several tests were conducted with the fuel before and after material thermal aging tests. Acid Number, Existent gum, hydroperoxides, conductivity and visual color were measured on the three fuels (JP-8 control, + 100 and +100 4x) after exposure to non-metallic materials. Fuel conductivity, color, and elemental analysis were measured on the test fuels and control fuel after subjected to thermal aging with metallic materials. Atomic absorption (graphite furnace) and inductively coupled plasma-atomic emission spectroscopy AA/ICP-AES proved to be of value in determining the concentration of metallic elements which may be extracted into the fuel by the fuel's chemical / corrosive attack on the metallic alloy. Specification guidance used in evaluating the fuel before and after thermal aging tests are as follows:

TEST	SPECIFICATION / DOCUMENT

Color Visual Observation

Acid No. ASTM D-3242 (Modified)

Gums ASTM D-381 Hydroperoxides ASTM D-3703

(See current revision using new voltametric method)

Conductivity * ASTM D-2624 / D-4308

AA/ICP-AES Used equipment manufacturers

measurement techniques

Fuel Additives ASTM D-4054 & ASTM D-2-1137

KT2 = Fuel conductivity corrected to 72°F; KT1 = Fuel conductivity measurement;

T1 = Fuel temperature measurement

G. DATA COLLECTION

Standard laboratory practice was observed in all test activities and data collection. Care in maintaining the integrity of the fuels samples and materials samples included clean environment maintenance, careful handling practices and accurate identification and labeling. Test and measurement equipment was used in accordance with manufacturers directions and with appropriate standards and specifications. (See preceding Sections)

Tests were conducted and data collected in Room 145, a properly maintained and vented explosion proof laboratory room at Wright Laboratories in B-490 at WPAFB and laboratories at Kettering Laboratories on the University of Dayton Campus. In addition, Wright Laboratories facilities in B-70 and in B-462 at WPAFB were used in conducting fuel property tests. Test measurements and observations were recorded in all laboratories by qualified engineers and technicians.

Test activities and data collection were correlated among the test sites through identification of materials samples I.D. numbers, additives, fuel type, test and control fuels and test temperatures. Data collected in the laboratories was consolidated onto a single data sheet.

^{*} Fuel conductivity measurements were obtained by using a digital conductivity meter Model 1152 Emcee Electronics Inc., Manufacturer All measurements were temperature corrected to 72°F IAW LOG10 KT2+LOG10KT1-8*10E-10(T1-72F). (See Figure # 3a)

II. DATA PRESENTATION

Two formats were developed to record the consolidated thermal aging test results and evaluations of each individual material of this program. These formats contain both the material / fuel exposure results and the fuel / material exposure test results. The non-metallics format Figure #6 provides for the entry of all the material property test results, evaluation criteria and the evaluation of those results, as well as the fuel / material exposure control fuel general observations. The metallic format Figure #7 provides for the entry of all the material property test results and the evaluation of those results as well as the fuel / material exposure / control fuel and general observations.

The control fuel results are shown in order to illustrate the effects of thermal stress on fuel without the inclusion of a metallic or non-metallic fuel system material. The control fuel was not necessarily thermally stressed at the same time as the test fuel/material exposure. The two control fuels used were JP-8 (93-POSF-2980) or, later (June '95) in the test program, JP-8 (92-POSF-2926). The 92-POSF-2926 fuel resulted in higher degradation to some material properties as evidenced by comparing the post property test results with the 93-POSF-2980 results of the same materials. This evidence was particularly noted at a later date during the evaluation of a different thermal stability package. A test was conducted on three selected materials by reversing the control fuel and test fuels to determine the impact on the Betz test results. (See Table 2.) Although the results do depict a difference between the two fuels, they do not change the Betz TSA overall evaluations.

The test fuels were: a) JP-8 (93-POSF-2980) with thermal stability additive at a normal concentration (+100); and b) JP-8 (93-POSF-2980) with thermal stability additive at a four times normal concentration (+100 4x). During the 1997 calendar year, 92-POSF-2926 was used exclusively as both the test fuel and the baseline fuel due to the depletion of 93-POSF-2980 fuel.

RE-TEST RESULTS FOR JP-8 + 100 BETZ (TSA) ADDITIVE $_{AND}$

MATERIALS COMPATIBILITY COMPARISON OF 93-POSF-2980 VS. 92-POSF-2926

MATERIAL TEST I.D.	PHYSICAL PROPERTIES	CONTROL	JP-8 FUEL (93 POSF) AGING 28 DAYS / 200 ° F					
ТҮРЕ	EVALUATED AT	AT ROOM TEMP.	2980 JP-8	2926 JP-8	2980	2926	2980	2926
TEST DATE	28 DAYS 200° F	NO AGING	NO ADD. (TSA)	NO ADD. (TSA)	BETZ	BETZ	BETZ X 4	BETZ X 4
I.A.2	LAP SHEAR (PSI)	3755	3771/ 2932 *	4000 *	2982	3575 *	3188	3526 *
ADHESIVE	COHESIVE (%)	100	100/ 100	100 *	100	100 *	100	100 *
VINYL PHENOLIC								
9/26/96								
I.A.5	LAP SHEAR (PSI)	4294	3879/* 3659	3585 *	3884	3702 *	3851	3693 *
ADHESIVE EPON	COHESIVE (%)	100	100/ * 100	100 *	100	100 *	100	100 *
DETA UN. MOD.								
EPOXY 9/27/96								
I.F.5 ESM FOAM CONDUCTIVE	TENSILE * (PSI)	14/* 15	9/* 11	9*	11	8*	11	8*
CLASS I.	ELONGATION (%)	146/* 118	92/* 87	89 *	92	90 *	85	96 *
MIL-F- 87260 10/3/96	RESISTIVITY (PS/M)	5.52E+11/* 1.29E+11	2.45E+I2* 3.92E+11	2.45E+12*	3.98E+11	2.21E+ 12 *	3.06E+11	2.45E+12*

[•] RE--TEST/NEW DATA

Table 3.

TEST EVALUATION CRITERIA

<u>Material Identity</u>	Test	<u>Criteria</u>
I.A. Adhesives	Lap Shear Cohesion	30% Decrease 100% Minimum Value
I.B.1 Bladder (Innerliner)	Tensile Elongation	20% or 50% Decrease (Depending on Type of Construction) 35% Decrease
	Volume Swell	12% Maximum Value
I.B.11,13,14 Bladder (Nylon)	Tensile Elongation	20% Decrease 35% Decrease
I.B.15,16 Bladder (Self-Sealing)	Leakage	0 at Ambient Pressure
I.C. Coatings	Hardness (Pencil) Tape Adhesion	0 Point Decrease Pass Minimum Value
I.D.1-9 Sealants (curing)	Tensile Elongation Volume Swell Hardness (Shore A) Cohesion Peel Strength	200 psi Minimum Value 150% Minimum Value 8% Maximum Value 30 Points Min. Value 100 % Minimum Value 20 lb./in. Minimum Value (200°F)
I.D.6 Sealant (Non-Curing)	Peel Strength	12 lb./in. Minimum Value (160°F)
I.D.10,11 Sealants (non-curing)	Volume Swell Rupture Pressure	8% Maximum Value 3.5 inch Hg Minimum Value
I.E.1-3 Composite	Laminar Shear	20% Decrease
I.F.1.1&2. Filters	Bubble Point	3.3 inch H ₂ 0 Min. Value
I.F.2 Filters	Bubble Point	4.2" H ₂ 0 Minimum Value
I.F.3., 4., 9. Foam (ESM)	Tensile Elongation	45% Decrease 40% Decrease
I.F.5 & 6 Foam (ESM, Conductive)	Tensile Elongation Resistivity (Ohm-cm)	45% Decrease 40% Decrease 1.0E12 Ohm-cm Maximum Value

Table 3. (Cont'd)

		Table 3. (Cont'd)
I.G.1.,2.,3., Gaskets "O" Rings	Tensile	25% Decrease
4.,9. (Nitrile)	Elongation	25% Decrease
	Volume Swell	0 % Minimum & 25% Maximum
	Hardness (Shore A)	5 pts (Decrease) & 5 pts (Increase)
	Compression Set	50% Maximum
I.G.5.,10., Gaskets "O" Rings, Fluo	prosilicone	
II.G.1.,2.,5.,7.,13.,14.,15	Tensile	45% Decrease
	Elongation	35% Decrease
	Volume Swell	0 % Minimum & 25% Maximum
	Hardness (Shore A)	20 pts Decrease
	Compression Set	30% Maximum
I.G.6.,7., Gaskets, "O" Rings Fluor	ocarbon	
II.G.3.,6.,9.,12.	Tensile	20% Decrease
	Elongation	20% Decrease
	Volume Swell	0% Minimum & 10% Maximum
	Hardness (Shore A)	5 pts Decrease & 5 pts Increase
	Compression Set	60% Maximum
I.,G,8 Gaskets, "O" Rings, Perfluo	rocarbon	
II.G.4.,8.	Tensile	20% Decrease
	Elongation	15% Decrease
	Volume Swell	0% Minimum & 5% Maximum
	Hardness (Shore A)	5 pts Decrease & 5 pts Increase
	Compression Set	60% Maximum
I.H.2 Hoses	Tensile	20% Decrease
	Elongation	30% Decrease
	Volume Swell	8% Maximum Value
	Hardness (Shore A)	12 pts Decrease & 12 pts Increase
I.I.1 Teflon	Tensile	20% Decrease
	Elongation	30% Decrease
I.I.24. Nylon & Polyethylene &	Tensile	20% Decrease
Kapton	Elongation	10% Decrease
I.I.6. Vinyl Plastic	Tensile	15% Decrease
·	Elongation	15% Decrease
I.I.7. Kynar	Volume Swell	N/A
212111 223 2302	Hardness (Shore A)	90 pts. (Control Material)
I.I.12.,13. Teflon, Nylon,	Wet Dielectric	< 300 uA (Control Material)
Kapton, Composite		
(Wire Insulation)		
I.I.13.1 Nylon Wire Coax Ctr.	Hardness (Shore A)	<400 uA (control material)
I.K.1.1.,2.,3.,I.K.4.,I.K.7, I.K.8.1.,2 Miscellaneous Materials	Visual Observations	Softness, discoloration, etc.
I.K.12 Fuel Qt Gaging,	Hardness (Shore A)	0 % Decrease
Probe Coating	Hardness (Shore B)	0 % Decrease

I.L.1. Thread Lock	Torque	15 inch lb. (Control)
I.L.2. Thread Lock	Torque	34 inch. lb. (Control)
I.L.3. Thread Lock	Torque	13 inch lb. (Control)
I.O.18 Floats	Visual	Float Fuel Level Before/ After Thermal Stress
I.P.1. Potting Compound, Epoxy	Lap Shear Cohesion	15 psi Dec 100 Minimum Value
I.P.2.1 Polysulfide	Tensile Elongation Volume Swell Hardness Shore (A) Cohesion Peel Strength	20% Decrease 20% Decrease -10% Minimum Value 10 pts Dec. & 10 pts Inc. 100% Minimum Value 20 lb./inch
I.P.2.2.1.1 Potting Compounds	Visual Observation	Shrinkage from Conductors

III. TEST RESULTS

A summary of the test results of the materials subjected to thermal aging in the additive test fuels and in the control JP-8 fuel is presented in the summary table, Section VIII. Each material shown is presented in this table at the temperature(s) to which it was tested. The overall test result / evaluation of this summary table was taken from each materials individual data sheet as presented in Section IX. of this report. The "W" symbol indicates a material test result which was within the allowable requirements set forth. An "O" symbol indicates a material test result which was outside the allowable requirement. The "OT" symbol indicates that a material was tested to a temperature beyond its limits i.e. to a temperature higher than the material was designed to (or would be expected to) tolerate. An "I" indicates that a test still is planned but has not yet been conducted. The "NT" indicates no test is planned. The use of the symbol "CN" indicates control (JP-8 fuel/material) and is primarily associated with metallics comparison evaluations.

The *metallic* materials evaluation directly compares the results obtained when materials were subjected to the JP-8 test fuels (JP-8 +100 and JP-8 +100 4x) to the results obtained when materials were subjected to the JP-8 control fuel. In contrast to the metallics evaluation, the non-metallics evaluation includes a second screening criteria in which the thermally stressed materials were directly compared to the unaged control (new) material allowable tolerance requirement. If the test results with test fuels (JP-8 + 100 in normal concentrations and in 4x concentrations) are below the test results with JP-8 / material / thermally stressed fuel, but within the material allowable tolerance requirement, the test fuel (additive) is considered to be compatible with the test materials.

Materials are reported in the following test results sections as having "passed" when they are assigned a "W" (within allowable requirement) for *all* material property tests in the data collection format.

Materials are reported as having "failed" when they were rated with an "O" (outside allowable requirement) in *any* material property test in the data collection format. A material that is reported as having failed may actually have had acceptable ("W", within allowable requirement) results in one or more of the tests. A material has failed in the context of this report when it has failed to meet the allowable requirement in *any one* test.

Materials are reported as having <u>"failed"</u> when they were rated with an <u>"OT"</u> (material ested beyond temperature range) even though the material would not have been expected to tolerate the test temperatures.

The Betz additive package was judged acceptable primarily based on its comparison to JP-8 (control) fuel.

Section IX of this report contains the complete database for all the materials' individual physical property test results / evaluations for a given temperature and the thermal aging test period(s) 28 and 7 days for selected materials. This section has all the data results / evaluation for each of the approximately 295 tests and 222 materials involved in this evaluation.

Discussion of Test Results

I.A. Adhesives

I.A.3 This adhesive, I.A.3., Nitrile Mod Epoxy, failed cohesion at 200°F but passed at 160°F in JP-8 and Betz fuels. The 200°F temperature was considered an over temperature for this material.

I.A.9 This adhesive , I.A.9. failed in JP-8 control fuel but passed in the fuel with Betz additive (JP-8 \pm 100) and (JP-8 \pm 100 4x) indicting that the \pm 100 additive retarded degradation.

I.A.10, an acrylic adhesive, I.A.10., failed in both JP-8 and the test fuels, +100 and +100 4x. This material is not resistant to fuel and should not be used in contact with fuel.

I.B. Bladders

Several of the bladder innerliners failed at 200° F. Those materials failing due to over-temperature in the JP-8 control fuel at 200°F included: I.B.1 Nitrile, I.B.2, Nitrile; I.B.4 Nitrile; I.B.5 Polyurethane (also failed at 160°F in test fuel); I.B.7 Nitrile; and I.B.8 Urethane. (These latter two materials were old and had been stored in cabinets for 15 years.) I.B.4, I.B.5 and I.B.7 also failed in the test fuels at 200°F. Of those failures, the results in fuel with Betz at normal concentrations and higher concentrations (JP-8 +100 4x) showed improvement over or near equivalence to the JP-8 fuel except I.B.5. The I.B.5 Polyurethane innerliner materials failed volume swell at both 200°F and 160°F in Betz fuels; however, this high swell characteristic did not adversely weaken its tensile and elongation characteristics and is therefore considered satisfactory. The results of these tests have been provided to the manufacturers for their evaluation and consideration. The remaining innerliners passed at 200°F in JP-8 and Betz fuels. I.B.4 was retested successfully at 160°F in JP-8 and Betz fuels.

I.B.11 Nylon, I.B.12, Polyester I.B.13, I.B.14 Nylon Structural Bladder Cell Cloth

These materials **passed** at **200°F** in both the control fuel and fuels with Betz additive. (Except I.B.13)

I.B.13 Polyester cloth failed the Elongation test at 200°F in JP-8 and Betz fuels. However, the results in test fuels were better than results in JP-8 fuel.

I.B.15, I.B.16 Self Sealing Bladder Materials

These materials sealed after ballistically shot when subject to JP-8 and Betz fuel. (Normal concentration only)

I.C. Coatings

All of the **Coating** (I.C.1.,2.,3.,4.,5.) **materials passed** at **200°F** in fuels with **Betz** additives at normal concentration (**JP-8** +**100**) and at higher concentration (**JP-8** +**100 4x**). *I.C.1 Nitrile failed tape adhesion in JP-8 control fuel*. I.C.6 Epoxy-Polyamide on A-36 plate steel at 120 °F passed in JP-8 and Betz fuels.

I.D. Sealants

Most of the **Sealants** (I.D.) **passed at 200°F** in **JP-8 and Betz fuels** with the *exception of two Polysulfides I.D.8 and I.D.9* which were re-tested at 160°F and passed. I.D.8 and I.D.9 failed cohesion (94%) in 4x Betz at 160°F but passed cohesion (100%) at 200°F. This slightly out-of-tolerance condition is considered to be caused by improper material test specimen preparation prior to the 160°F test.

I.E. Composites

All of the Composites (I.E.) tested passed at 200°F in JP-8 and Betz fuels.

I.F.1.1,.2, I.F.2 Fuel Filters

All three fuel filters passed at 250°F (I.F.1.1, I.F.1.2, I.F.2) in JP-8 and Betz fuels.

I.F. Foams (**ESM**)

The **Foams**, I.F.3, I.F.4, I.F.5 I.F.6 (explosion suppression materials) all **passed at 200°F** in **JP-8 and Betz fuels**.

I.F.9 passed at 160°F. (Note: Aircraft application and foam manufacturer of this material are unknown.)

I.G./II.G. Gaskets

Because of the many types of <u>Gaskets/"O" Rings</u>, different use criteria required that they be tested at various temperatures. They are discussed individually below:

I.G.1 and I.G.2 Nitriles

These "O" Rings are for use in *hydraulic fluids* and *are not fuel resistant*. They failed at both at 200°F and at 160°F in JP-8 and Betz fuels.

I.G.3 **Nitrile** (MIL-P-5315)

This "O" Ring material *is fuel resistant*, but **failed** at 325°F, at 200°F, and at 180°F. It **passed** at 160°F in **fuels with Betz** additives, but the material **failed** tensile and elongation at 160°F in JP-8 control fuel.

I.G.4 **Nitrile** (AMS 7271)

This "O" Ring material *is fuel resistant* but **failed tensile**, volume swell and hardness in JP-8 and Betz fuels at 200°F, although it passed at 160°F in JP-8 and Betz fuels.

I.G.5., 6., 7., 8, 10, 11, 12, 13. See results under II.G.2, II.G.6, II.G.3, II.G.4, II.G.1, II.G.10, II.G.11 below

I.G.9 Nitrile

This "O" Ring material failed hardness at 160°F with JP-8 and Betz fuels; however, the test results in fuels with Betz additives (both concentration levels) were equal to or improved over JP-8 control fuel. The material also failed at 200°F in JP-8 and Betz fuels; nevertheless, significant improvements in test results were noted with the materials in the fuels with Betz and Betz 4x additives over results in the JP-8 control fuel.

I.G.13 Cork

This **Cork** material (used for gaskets and floats) **passed** at **200°F** in JP-8 and Betz fuels.

II.G.1/I.G.10 Fluorosilicone

This "O" Ring material failed tensile, elongation and compression set at 325°F and tensile, elongation and volume swell at 275°F in JP-8 and Betz fuels. It was not tested at 200°F with any fuel.

II.G.2/I.G.5 Fluorosilicone

This "O" Ring material failed tensile, elongation, volume swell, hardness, compression set at 325°F with JP-8 and Betz fuels. At 250°F, it failed tensile and hardness in JP-8 control fuel. However, it passed at 200°F in JP-8 and Betz fuels.

II.G.3/I.G.7 Fluorocarbon (Low Temperature Material)

This "O" Ring material passed all tests at 400 °F, 325 °F and at 200°F in both test fuels. The JP-8 fuel at 325 °F and 400 °F results were only slightly out of the tensile tolerance requirement.

II.G.4/I.G.8 Perfluoroelastomer

This "O" Ring material passed all tests at 325°F in JP-8 and Betz fuels. This material passed all tests at 200°F in JP-8 and Betz fuels.

II.G.5 Fluorosilicone

This "O" Ring material failed tensile and hardness at 325°F and all tests at 275°F in JP-8 and Betz fuels.

II.G.6 **Fluorocarbon**, (Low Temperature Material)

This "O" Ring material passed all tests at 325°F but failed tensile at 400°F in JP-8 and Betz fuels. However, the Betz and Betz 4x tensile results were improved over the JP-8 fuel test results at 400°F.

II.G.7 Fluorosilicone

This "O" ring material failed tensile and compression set at 325°F in JP-8 and Betz fuels. However, the test fuels were approximately equal or were better than the JP-8 fuel test results

II.G.8 Perfluoroelastomer

This "O" ring material failed compression set at 325°F in JP-8 and Betz fuels. Test fuels were approximately equal to or were better than the JP-8 fuel test results.

II.G.9/I.G.6 Fluorocarbon

This "O" Ring material passed at 200°F in JP-8 and Betz fuels. The *tensile* strength test failure of this material at 325°F in the fuels with normal concentration of Betz additive was equal to its failure in JP-8 control fuel. The 4x concentration of Betz TSA was slightly worse than the JP-8 control fuel.

II.G.10/I.G.11 Urethane, Pump Washer

This Gasket material failed at 325°F, and at 200°F, but it passed at 160°F in JP-8 and Betz fuels. The 325°F, and 200°F failures were considered over-temperature.

II.G.11/I.G.12 Plastic, Pump

This material passed at 200°F in JP-8 and Betz fuels but failed at 325°F. The failure was considered an over-temperature at 325 °F

II.G.12 **Fluorocarbon**, Improved (Low Temperature Material)

This "O" Ring material passed at 325°F and at 400°F in JP-8 and Betz fuels. No compression set data was recorded at either temperature.

II.G.13 Fluorosilicone, Improved

This "O" Ring material failed tensile, elongation, volume swell, compression set at 325°F in JP-8 and Betz fuels; however, the material passed at 200°F in JP-8 and Betz fuels.

II.G.14 Fluorosilicone, Fluorosilicone with Teflon

This "O" Ring material passed at 180°F in JP-8 and Betz fuels. It was not tested at 200°F or 325°F.

II.G.15 **Fluorosilicone**. Fluorosilicone with Teflon

This "O" Ring material passed at 200°F in JP-8 and Betz fuels.

I.H.2 through I.H.5 Hoses

I.H.2. I.H.3. and I.H.4 <u>Hose Innerliner</u> materials <u>failed</u> tensile, elongation and hardness at <u>200° F</u> in JP-8 and Betz fuels. The temperature, **200** °F, is beyond the **expected service use of these materials.** The material was re-tested in <u>JP-8 fuel</u> at <u>160° F</u> and <u>passed</u>. Based on the results of this re-test, the Betz and Betz(4) test results which were equal to or exceeded JP-8 results at <u>200° F</u> also are considered to be satisfactory at 160°F. I.H.5 passed in the test fuels at 200° F but failed tensile and elongation in JP-8.

I.I.1-9 Wire Insulation

I.I.1 **Teflon (TFE)**

This material passed at 200°F in JP-8 and Betz fuels.

I.I.2 Nylon (Zytel 101) (Old material, beyond reasonable shelf life)

This material **failed** elongation in JP-8 but test fuels exceeded JP-8 tests results at **160°F**. The test fuels exceeded JP-8 elongation results. At **200°F**, the material failed elongation in JP-8 and Betz fuels.

I.I.2 Nylon (New material)

This new material **failed** tensile and elongation at **200°F** in JP-8 but passed tensile in the Betz and Betz 4x test fuels. The test fuels exceeded JP-8 elongation results.

I.I.3 Polyethylene Film

This material **failed** tensile at **200°F in JP-8 and Betz fuels.** However, the test fuels material results were equivalent to the JP-8 test results.

I.I.4 Kapton/Upilex

This material passed at 200°F in JP-8 and Betz fuels.

I.I.5 Marmon Clamp

No test is planned for this material. The parts materials could not be identified.

I.I.6. Vinyl Plastic

This material **failed** at **200**°F in JP-8 and Betz fuels and **failed** in JP-8 at **160**°F. No tests were conducted with the test fuels at **160**°F

I.I.7 Kynar

This material passed at 200°F in both test fuels.

I.I.9 Magnetic Wire Insulation Type I

This material passed at 325°F in both test fuels.

I.I.10 Teflon/Kapton (Composite) Wire/Insulation

This material passed at 200°F - in JP-8 and Betz fuels.

I.I.11 Shrink Wrap

No test planned.

I.I.12, 13, 13.1 Teflon, Nylon Wire Insulation and Coax Shield.

These materials all passed in JP-8 and Betz fuels at 200°F

I.J. 1 - 16 **Joining Materials** (Brazing and Welding)

The materials I.J.2 through I.J.10, I.J. 13 and I.J.14 all passed at 325°F in both test fuels (those fuels containing Betz additives in normal and 4x concentrations). The I.J.11 tin and lead solder spots failed at 325°F in the Betz fuels. This material was tested beyond its temperature limits and was successfully re-tested at 200°F. The I.J.I., I.J.12, I.J.15 and I.J.16 all passed at 200°F in both test fuels.

I.K. .1 - .12 Miscellaneous Materials, Identification Plates and Assemblies

I.K.1.1, I.K.1.2, I.K.1.3 Ink Stamp Top Coatings

These identification marking tag materials **passed** at **200°F** in JP-8 and Betz fuels.

I.K.2., 3., 5.,6a., 6b., 6c. 8.1., I.K.9, I.K.10 1 & 2, I.K. 11. 1 & 2

These materials and assemblies have not been tested. The assemblies I.K.10.1 through I.K.11.2 are planned to be tested in a follow-on program. No tests are planned for the remaining materials/protective coatings.

I.K.4 Name Plate

This identification plate **passed** at **200°F** in JP-8 and Betz fuels.

I.K.7 Carbon Bearing

This bearing material **passed** at **200°F** in JP-8 and Betz fuels.

I.K.8.2, I.K.8.3 Carbon Bearing

These two bearing materials **passed at 325°F** with JP-8 and Betz fuels.

I.K.12 Polyphyenylene Sulfide

This material passed at 200°F with JP-8 and Betz fuels.

I.L. 1 - 4 Locking Devices

These three materials **passed** at **200°F** with JP-8 and Betz fuels.

I.M.1 through I.M.43 **Metallics**

I.M.1 through I.M.20, 23, 24, 25, 26.A, 26.B., 27, 28, 30 through 33, 36, 39, 41, 42 All **passed** at **200°F** with both test fuels.

I.M.1, 3, 7, 9, 21, 22, 23, 25, 27, 28, 30, 31, 32, 34, 35, 37, 38, 40, 43

All **passed** at **325°F** with both test fuels.

I.M.2, 4, 5, 6, 8

All **failed** at **325**°F due to testing beyond the materials temperature range in JP-8 and Betz fuels, but were **tested successfully at 200**°F.

I.M.29

This material **failed** at both 325°F and 200°F but **tested successfully at 160°F** with both test fuels.

II.M.1 through II.M.41 **Metallics**

II.M.1 through II.M.41

All **passed** at **325°F** with both test fuels except II.M.31, II.M.38 and II.M.39 which were not tested.

II.M.2., 3, 4, 5, 6, 9, 21, 22, 23.1, 23.2, 25

All **passed** at **200°F** with both test fuels.

II.M.2 and II.M.23.4 passed at 400°F with both test fuels

I.O.1 through I.O.8 Floats

I.O.1 through I.O.7 float materials **passed** at **225°F** in both test fuels. I. O. 8 cork material **passed** at **200°F** with both test fuels.

I.P. Potting Compounds

I.P.1 Epon Epoxy

This material **passed** at **200°F** with JP-8 and Betz fuels.

I.P.2.1, & 2.2 Polysulfide Potting Compound

I.P.2.1 Polysulfide Slab

Polysulfide slab **failed** at **200°F** with JP-8 and both test fuels.

I.P.2.2 Polysulfide Electrical Connector Application

This material **failed** in this application at **200°F** due to **high material shrinkage** around wire conductors, insulation with JP-8 and both test fuels. (See Figure #8.)

Summary and Test Results for 7 day material tests are shown in VIII and IX report sections herein for the following materials:

I.B.4., I.B.5., I.C.2., I.D.2., I E.1., I.E.2., I.F.3., I.F.4., I.F.5., I.G.2., I.G.6., II.G.2., 3,7.

I.G. and II.G. "O" rings 7 day aging test results were similar to 28 day aging property test results, indicating most material deterioration occurs within 7 days.

Elemental Analysis of Fuel

Elemental analysis (graphite furnace AA/ICP-AES) tests were conducted to determine whether elements were leaching from the metallic test specimens into the JP-8 control fuel and into fuels containing thermal stability additives (+100 and +100 4x). Early testing indicated that elemental analysis detected, in some cases, only a small amount of a given element in JP-8 control fuel but a higher amount in JP-8 +100 and an even higher amount in the fuel having +100 4x concentration of additive. It was later determined that the results in these tests had been affected by improper sample preparation. It was noted that the elements had been held in suspension in the fuels with +100 and +100 4x as a result of the additive's detergent/dispersant qualities. The elements had been settling to the bottom of the test beakers in the JP-8 control fuel and that fuel discarded. In addition, the fuel had not been mixed before test samples were taken which resulted in improper readings. Improved mixing of all sediments before graphite furnace / ICP measurements were taken for elements resulted in more accurate readings. Subsequent readings found no significant differences between elements detected in JP-8, JP-8 +100 and JP-8 +100 4x with fuel samples taken from the II.M.23 leaded bronze tap MS285.

Early testing did not test most metallic materials for elemental analysis. Elemental analysis data contained in this report may not reflect proper mixing techniques since re-test of all the many materials would have been prohibitive. However, all metallic materials with JP-8 and Betz fuels (JP-8, TSA and TSA 4x) were subject to microscopic evaluations.

IV. CONCLUSIONS

- A. On the basis of a direct comparative evaluation with JP-8 and new material allowance tolerances for the materials tested and evaluated, the Betz/Dearborn SpecAidâ
 8Q462 thermal stability fuel additive is compatible with the materials found in Air Force aircraft fuel tanks, systems and engines and ground support equipment.
- B. The <u>Betz/Dearborn SpecAidâ 8Q462</u> thermal stability fuel additive actually <u>lessens</u> the <u>fuel degradation of many non-metallic materials</u>. In addition the <u>Betz/Dearborn SpecAidâ 8Q462 thermal stability fuel additive generally results in cleaner metallics.</u>
- C. A fuel selected to be used for a particular fuel additive should also be used as the JP-8 control (comparative) fuel. Since different fuels may have significantly different oxidation characteristics, care should be taken to always compare the results of test using the same control fuel. Also, the control fuel/material aging containers should be placed in the same oven under the same conditions and at the same date and period of time to which the test (additized) fuel is subjected.
- D. Materials Below/Outside Criteria with Betz TSA Fuel:
 - 1. Materials in which the test results were below JP-8 control test results and outside the new material tolerance allowance are listed below: These material results although outside the established evaluation criteria, are considered acceptable for aircraft fuel system use for the following reasons:
 - a. I.B.5 Bladder Tank Innerliner, Polyurethane, 160°F and 200°F. This polyurethane material had volume swell characteristics with JP-8, TSA and TSA 4x concentrations at both 160°F and 200°F of --/17%, 23/28% and 17/29% respectively, which are outside the allowable tolerance criteria requirement of 12 %. This I.B.5 Polyurethane innerliner material failed volume swell at both 200°F and 160°F. However, the I.B.5 Polyurethane high swell characteristics did not adversely weaken its tensile and elongation characteristics and therefore this material is considered acceptable for use with the Betz additive.
 - b. I.B.8 Bladder Tank Innerliner, Polyurethane, 200°F. This polyurethane material had volume swell characteristics with JP-8 at 200°F of 13% which is just slightly outside the allowable tolerance criteria requirement of 12% and is thereby considered satisfactory.
 - c. I.D.8 PR-1776, Polysulfide, AMS3281. This material cohesive properties after 28 days of aging at 160°F with 4x additive were 94% and outside of the acceptable tolerance allowance of 100% cohesion. However, at 200°F after 28 days, the same material had 100 % cohesive properties in the 4x test fuel. This cohesive failure was likely due to improper specimen preparation and is therefore considered acceptable with the 4x test fuel.

- d. I.I.3 Polyethylene (HDP). The acceptable tolerance requirement for the tensile test for this material is 20%. The tensile test result for JP-8 fuel was 32%; the tensile test result for the TSA fuel also was 32%. The result for the 4x concentration of TSA was 33%. The TSA did not degrade the material more than JP-8 and is therefore acceptable.
- E. Numerous materials were determined to have fuel system use limitations and prohibitions.
 - 1. <u>Unsuitable Materials for use in any Aircraft Fuel System.</u> Materials unsuitable for aircraft use in frequent and/or continuous contact with JP-8 fuel or TSA fuel with physical properties significantly outside acceptable tolerance requirements:

a.	I.A.10	Adhesive Acrylic
b.	I.G.1	Hydraulic Nitrile ("O" Ring Applications)
c.	I.G.2	Hydraulic Nitrile ("O" Ring Applications)
d.	I.I.6	Vinyl Plastic
e.	I.P.2.1,2.2	Potting Compound, Polysulfide, MIL-S-8516

2. <u>Material Over Temperature</u>. These materials are considered to be thermally aged to a temperature beyond their physical limits. Use of these materials over the specified temperature may result in system application failure.

Non-Metallics

- a. I.A.3, 2 Nitrile Mod. Epoxy at Temperatures
- b. over 160°F in JP-8 & Betz fuels.
- c. I.B.1., Nitrile Bladder Innerliner; I.B.2, Nitrile Bladder Innerliner; in JP-8 and Betz fuels at temperatures higher than 160°F.
- d. I.B.4 and I.B.5 Nitrile bladder innerliner at temperatures higher than 160°F in JP-8 and Betz fuels.
- e. I.B.7, Nitrile at temperatures over 160°F in JP-8 and Betz fuels
- f. I.B.8, Urethane, Bladder Innerliner at temperatures over 200°F in JP-8 and Betz fuels.
- g. I.B.13, Nylon Cloth at temperatures over 160°F in JP-8 and Betz fuels.
- h. I.C.1, Nitrile, Coating, at temperatures above 160°F in JP-8 fuel
- i. I.D.8, Polysulfide, Sealant; I.D.9, Polysulfide Sealant, at temperatures above 160°F in JP-8 & Betz fuel
- j. I.G.3, Nitrile, MIL-P-5313, I.G.4 Nitrile (AMS 7271) and I.G.9 "O" Ring at temperatures over 160°F
- k. II.G.1., II.G.2., II.G.5., II.G.13., Fluorosilicones, (MIL-R-25988) "O" Ring at temperatures over 225°F in JP-8 and Betz fuels. (See V. Recommendation, B.1.)

- 1. II.G.6, Fluorocarbon, MIL-R-83485 at temperatures over 325°F in JP-8 and Betz fuel.
- m. II.G.7, Fluorosilicone "O" Ring at temperatures over 225°F in JP-8 & Betz fuels. (See V. Recommendation, B.1.)
- n. II.G.8, Perfluoroelastomer "O" Ring, at temperatures of 325°F and over in JP-8 and Betz (Note high compression set value.)
- o. II.G.9, Fluorocarbon "O" Ring, at temperatures of 325°F in JP-8 & Betz fuels
- p. II.G.10./I.G.11. U<u>rethane (PO-652) over 160</u>°F in JP-8 and Betz fuels
- q. II.G.11/I.G.12 Urethane (JT-90) over 200°F in JP-8 and Betz fuels
- r. I.H.2, Nitrile/Acrylic, Hose, Aerial Refueling MIL-H-4495 at temperatures over 160°F in JP-8 and Betz fuels
- s. I.H.3, Nitrile, Ground Refueling hose at temperatures over 160°F in JP-8 and Betz fuels.
- t. I.H.4, Nitrile, Ground Refueling Hose at temperatures over 160°F in JP-8 & Betz
- u. I.H.5, Epichlorhydrin Ground Refueling Hose, at temperatures over 160°F JP-8 fuel (satisfactory with +100/4x Betz up to 200°F)
- v. I.I.2, Nylon 101 Film, at temperatures over 160°F
- w. I.I.3, Polyethylene, Film, at temperatures over 160°F in JP-8 and Betz

Metallics

- a. I.J.11,B36-21A Copper/Tin/Lead solder sponts over 200 °F in JP-8 and Betz fuel.
- b. I.M.2, Aluminum 6061-T4 Bare, at temperatures over 200°F in JP-8 and Betz fuel
- c. I.M.4, Aluminum 7075-T6 Chromic Acid Anodize, at temperatures over 200°F in JP-8 and Betz fuel
- d. I.M.5, Aluminum 7075-T6 Alodine, at temperatures over 200°F in JP-8 and Betz fuel
- e. I.M.6, Aluminum 7075-T6 Bare, at temperatures over 200°F in JP-8 and Betz fuel
- f. I.M.8, Aluminum 2219-T87 Bare, at temperatures over 200°F in JP-8 and Betz fuel
- g. I.M.29, Barium Ferrite, at temperatures over 160°F in JP-8 and Betz fuel
- F. Test results did not indicate the Betz in normal or 4x concentrations to be any worse than the JP-8 fuel in adding ions to the fuel such as copper and lead, i.e., leaded bronze II.M.23 from metallic materials.
- G. Fuel aging properties of "O" rings tested for 28 days versus 7 days were similar.

V. RECOMMENDATIONS AND SHORT MATERIALS LISTING

(for Frequent and/or Continuous Contact with Fuel Wetted Parts of Fuel Systems)

- A. Betz additive as related to fuel system materials compatibility be approved for use with USAF aircraft.
- B. Recommend not using materials in fuel systems at temperatures beyond their temperature range without a more extensive test evaluation program.
 - 1. Recommend Fluorosilicone "O" rings not be used at temperatures above approximately 225°F. (See AFRL Report AFRL-PR-WP-TR-2017)
 - 2. Recommend fluorocarbon "O" rings only be used at temperatures of 325°F to 400°F provided compression set data has been carefully reviewed and considered for a given application.
 - 3. Recommend nitrile "O" rings not be used at temperatures above 160°F.
 - 4. Future aircraft development programs should carefully evaluate fuel tank bulk fuel and recirculation fuel temperatures and determine whether PR-1776 (I.D.8) is a suitable material to use at temperatures above 160°F.
- C. Recommend conducting new research and development programs to re-formulate bladder innerliner and hose innerliner materials that can meet 225°F minimum continuous operations temperature. These programs should be implemented to meet near future needs.
- D. Recommend component application re-test of certain materials i.e. "O" rings in JP-8 in which the static test results were outside acceptable limits. Attempt to establish a correlation between static test results (free state) with dynamic fuel flow application (constrained state) test results.
- E. Utilize a shorter materials list for future evaluations with additives with similar chemistry to the Betz. (See Material Short List, Pages 37/38 herein)
- F. Great care should be taken not to substitute nitrile hydraulic "O" rings for nitrile fuel "O" rings.
- G. Evaluate the effect water may have on thermal stability fuel additive compounds and resultant changes that could negatively affect material deterioration.
- H. Insure proper fuel and TSA mixing procedures and that all sediments of stressed fuel are included in fuel samples taken for elemental analysis (atomic absorption and ICP measurements.)
- I. Further fuel evaluation of metallic materials such as copper, lead, cadmium and zinc that come in continuous contact with JP-8 fuel and JP-8 fuel additives should be carefully considered in any follow-on dynamic (fuel flow) evaluations and service tests.
- J. The use of polysulfide MIL-S-8516 as a potting compound for electrical connections in contact with fuel is not recommended.
- K. The use of an acrylic adhesive as a fuel tank adhesive is not recommended.
- L. Vinyl plastic use in contact with fuel is not recommended.
- M. "O" rings fuel aging testing should be reduced from 28 days to 7 days.

JP-8 ₊100 Materials Test List Recommended Follow On Additive Material Short List (Metallics)

	° F	MATERIAL	I.D. NO	I.D. NO
1.	200	7075 T-6 Bare	I.M.6	N/A
2.	325	C-356-T6	II.M.20	I.M.11
3.	325	304 S.S	II.M.12	I.M.15
4.	325	347 S.S.	II.M.8	I.M.18
5.	325	17-4 pH (100)	II.M.24	I.M.20
6.	200	CU / NI 90 / 10	I.M.26B	N/A
7.	325	LEAD AMS 4751	I.M.28	NA
8.	325	MONEL 400	II.M.27	I.M.34
9.	325	BRASS SHEET 268 (CU)//260	I.M.27	N/A
10.	325	4130 DENSIFIED, NEW SEALING, ION VAPOR DEPOSITION (IVD) SCRIBED	II.M.37	N/A
11.	200	AZ31-H24 AZ 91-T6 M	I.M.39	N/A
12.	325	718 INCO NICKEL	II.M.6	I.M.16
13.	325	440 S.S	II.M.11	I.M.17
14.	325	CPM 10-V	II.M.18	N/A
15.	325	135 MOD (NITRALLOY)	II.M.22	N/A
16.	325	TAP MS 285 (LEADED BRONZE) Polished Cy	II.M.23.2	N/A
17.	325	Ti-8Al-1Mo-1V	II.M.36	N/A
18.	325	SILVER PLATE A-286 TI PEAK AGED	II.M.21	N/A
19.	325	IN200 B, Ni 5 OR 6	I.J.8	N/A
20.	325	WASPALLOY Ni BRAZED AMS 4786 Ag	I.J.9	N/A
21.	200	QQ-571, SN 60 (TIN 60% / LEAD 40%) B3621A	I.J.11	N/A
22.	200	5052 H-34 WELDED 6061 T6 WITH 5356 FILLER	I.J.15	N/A
23.	325	4340 (280 KSI) AMS 6415	I.M.43	N/A
24.	325	303 STAINLESS	II.M.40	N/A
25.	325	TI-CP-70	II.M.41	N/A
26.	200	2024-T6	I.M.44	N/A
27.	325	MAG WIRE INSULATION TYPE I	I.I.9	N/A
28.	200	4130 CADMIUM PLATE (CLASS II) TYPE 2 Gold	I.M.23	N/A
29.	200	7075-T6 SULFURIC ACID ANODIZE THIN DENSITY	I.M.45	N/A
30.	200	7075-T6 ALODINE / 200 ALUMINUM	I.M.5	N/A
31.	200	2090 T8 AMS 4232 ALUMINUM	I.M.46	N/A

JP-8 ₊100 Materials Test List Recommended Follow On Additive Material Short List (Non-Metallics)

	° F	MATERIAL	I.D. NO
1.	160	ADHESIVE	I.A.2
2.	200	ADHESIVE (EPON)	I.A.5
3.	200	ADHESIVE	I.A.7
4.	160	BLADDER NITRILE	I.B.4
5.	200	BLADDER, POLYURETHANE	I.B.5
6.	200	COATING, MIL-S-4383 NITRILE	I.C.1
7.	200	COATING, MIL-C-27725, POLYURETHANE	I.C.2
8.	200	COATING (EPOXY)	I.C.3
9.	120	BULK TANK COATING (EPOXY) A-36 PLATE STEEL	I.C.6
10.	200	SEALANT MIL-S-8802 DICHROMATE	I.D.1
11.	200	SEALANT MANGANESE	I.D.2
12.	200	SEALANT (PRIMER) FLUOROSILICONE	I.D.5
13.	200	SEALANT, POLYURETHANE	I.D.6
14.	200	SEALANT, POLYTHIOETHER	I.D.7
15.	160	SEALANT, POLYSULFIDE	I.D.8
16.	200	COMPOSITE AS4/3501-6, EPOXY GRAPHITE	I.E.1
17.	200	COMPOSITE IM7/52504-GRAPHITE BISMALIEMIDE	I.E.2
18.	200	COMPOSITE AS 7/8551 EPOXY GRAPHITE	I.E.3
19.	200	FOAM MIL-F-87260 POLYURETHANE	I.F.6
20.	160	GASKET MIL-P-5315 "O" RING NITRILE	I.G.3
21.	225	GASKET MIL-R-25988 "O" RING FLUOROSILICONE	I.G.5
22.	325	GASKET, MIL-R-83248 "O" RING FLUOROSILICONE	II.G.9
23.	400	GASKET MIL-R-83485 (B) FLUOROCARBON	II.G.6
24.	160	HOSE, AERIAL REFUELING ACRYLIC NITRILE	I.H.2
25.	160	HOSE, GROUND REFUELING EPICHLOROHYDRIN	I.H.5
26.	160	TEFLON (FILM)	I.I.1
27.	160	NYLON (FILM)	I.I.2
28.	160	POLYETHYLENE (FILM)	I.I.3
29.	200	KAPTON (FILM)	I.I.4
30.	200	KAPTON/TEFLON (COMPOSITE) WIRE	I.I.10

VI. REFERENCE DOCUMENTS

Non-Metallics

MIL-HDBK-149B	Military Standardization Hand Book Rubber
ASTM D-1414	Standard Test Methods for Rubber O-Rings
ASTM D-412	Type II Standard Test Methods for Vulcanized Rubber and Thermoplastic Rubbers & Thermoplastic Elastomers - Tension
ASTM D-395	Method B Rubber Property - Compression Set
ASTM D-2240	Rubber Property - Durometer Hardness
ASTM D-471	Rubber Property - Effect of Liquids
ASTM D-624	Tear strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
ASTM D-257	DC Resistance or Conductance of Insulating Material
ASTM D-790	Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
ASTM D-413	Rubber Property - Adhesion to Flexible Substrate
Fed Std 1418	(Method 6301) Measuring Adhesion by Tape Test
MIL-R-25988	Rubber, Fluorosilicone Elastomer Oil- and Fuel- Resistant Sheets Strips, Molded Parts and Extruded Shapes
MIL-R-83485	Rubber, Fluorosilicone Elastomer, Improved Performance at Low Temperatures
SAE AMS 7257	Rings, Sealing, Perfluorocarbon Rubber High Temperature Fluid Resistant
SAE/AS 5172	Methods for Test Aerospace Sealants
SAE/ARP 901, MIL-F-8815	Bubble Point Test Method
ASTM D1044	Surface Abrasion, Resistance of Transparent Plastics (Taber Abrader)
Fed Test Standard 141 Method 6301	Wet Adhesion (Tape Test) Use (SM-250 Tape)
ASTM D3363	Pencil Hardness
SAE/AS 4373	Test Methods for Insulated Electric Wire (R 1995)

DSO495 MIL-S-4383C	Sealing Compound, Topcoat, Fuel Tank, Buna-N type
MIL-S-7502C	Sealing Compound, Integral Fuel Tanks and Fuel Cell Cavities, High Adhesion, Accelerator Required (Use MIL-S-8802)
MIL-S-8802F (4)	Sealing Compound, Temperature-Resistant, Integral Fuel Tanks and Fuel Cell Cavities, High Adhesion
DoD-P-15328D	Primer (Wash), Pretreatment (Formula No. 117 for Metals) (Metric)
MIL-S-83430A	Sealing Compound, Integral Fuel Tanks and Fuel Cell Cavities, Intermittent use to 360 Deg. F (182 Deb. C) (Use AMS 3276)
MIL-F-87260	Foam Material, Explosion Suppression, Inherently Electrically Conductive, for Aircraft Fuel Tank and Dry Bay Areas
AMS 3281	Sealing Compound, Polysulfide (T) Synthetic Rubber for Integral Fuel Tank and Fuel Cell Cavities Low Density (1.35 sp gr max), for Intermittent Use to 360 Degrees F (182 Degrees C)
MIL-S-85334	Sealing Compound, Noncuring, Low Consistency, Silicone, Groove Injection, for Integral fuel Tanks
MIL-C-27725B	Coating, Corrosion Preventive, for Aircraft Integral Fuel Tanks
AMS 3265	SAE Sealing Compound, Polysulfide (T) Rubber Nonchromated, Corrosion Inhibiting for Intermittent Use to 340 Degrees C (171 Degrees F)
MIL-P-25732C	Packing, Preformed, Petroleum Hydraulic Fluid Resistant, Limited Service at 275 Deg. F (132 Deg. C)
MIL-P-5315B	Packing, Preformed, Hydrocarbon Fuel Resistant
AMS 7271H	SAE Rings, Sealing, Butadiene-Acrylonitrile (NBR), Rubber Fuel and Low Temperature Resistant 60 - 70
MIL-R-83248C	Rubber, Fluorocarbon elastomer, High temperature, Fluid and Compression Set Resistant

MIL-R-83248/1A	Rubber, Fluorocarbon Elastomer, High Temperature, Fluid and Compression Set Resistant (O-Rings, Class 1, 75 Hardness)
MIL-R-83248/2	Rubber, Fluorocarbon Elastomer, High Temperature, Fluid and Compression Set Resistant (O-Rings, Class 2, 90 Hardness)
MIL-P-83461B	Packing, Preformed, Petroleum Hydraulic fluid Resistant, Improved Performance at 275 Deg. F (135 Deg. C)
MIL-P-83461/1B	Packing, Preformed, Petroleum Hydraulic Fluid Resistant Improved Performance at 275 Deg. F (135 Deg. C) Sizes and Tolerances
MIL-P-83461/2	Packing, Preformed, Petroleum Hydraulic Fluid Resistant Improved Performance at 275 Deg. F (135 Deg. C) for use in Boss Fittings, Sizes and Tolerances
MIL-B-83054B	Baffle and Inerting Material, Aircraft Fuel Tank
MIL-H-4495D	Hose Assembly, Rubber, Aerial Refueling
MIL-H-370G	Hose and Hose Assemblies, Non-Metallic; Elastomeric, Liquid Fuel (Use A-A-52554)
MIL-H-17902F	Hose, End Fittings and Hose Assemblies, Synthetic Rubber Aircraft Fuels
MIL-H-26521J	Hose Assembly, Nonmetallic, Fuel, Collapsible, Low Temperature with Non-Reusable Couplings
MIL-I-7444D	Insulation Sleeving, Electrical, Flexible
ASTM D4066 Rev B	ASTM Standard Specification for Nylon Injection and Extrusion Materials (PA)
DoD-L-85645A (1)	Lubricant, Dry Thin Film, Molecular Bonded
1N5610 - 1N5613 <i>EIA</i> 2N5613 - 2N5620 <i>EIA</i> AMS5613P <i>SAE</i>	Steel, Corrosion and Heat Resistant, Bars, Wire, Forgings. Tubing and Rings 12.5 Cr (SAE 51410) Annealed (UNS S41000)
MIL-L-46010D	Lubricant, Solid Film Heat Cured, Corrosion Inhibiting

MIL-S-22473E (8)	Sealing, Locking, and Retaining Compounds: (Single Component)
MIL-S-8516F	Sealing Compound, Polysulfide Rubber, Electric Connectors and Electric Systems, Chemically Cured
<u>Metallics</u>	
ASTM-945	Standard Test Method for Stress-Corrosion of Titanium Alloys by Aircraft Engine Cleaning Materials
ASTM D-2-1137	Research Report 20 Oct '81 "Support Data for D 4054"
ASTM 483-91	Total Immersion Corrosion Test for Aircraft Maintenance Chemicals
ASTM G1	Standard Practice for Preparing, Cleaning and Evaluating Corrosion Test Specimens
ASTM G46	Standard Guide for Examination and Evaluation of Pitting Corrosion
<u>Fuels</u>	
ASTM D-3242	Standard Test Method for Acidity in Aviation Turbine Fuel
ASTM D-381	Standard Test for Existent Gum in Fuels by Jet Evaporation
ASTM D-3703	Standard Test Method for Peroxide Number of Aviation Turbine Fuels (See Current Revision to ASTM-D-3703, Using New Voltametric Method)
ASTM D 2624	Standard Test Method for Electrical Conductivity of Aviation and Distillate Fuels
ASTM D-4308	Electrical Conductivity of Liquid Hydrocarbons by Precision Meter
MIL-T-83133D	Turbine Fuels, Aviation, Kerosene Types, NATO-34 (JP-8) and NATO-35
ASTM D 4054	Standard Practice for Evaluating the Compatibility of Additives with Aviation Turbine Fuels and Aircraft Fuel System Materials

VII. PHOTOGRAPHS AND TEST RESULT DATA SHEET SAMPLES

(Figures 1-8)

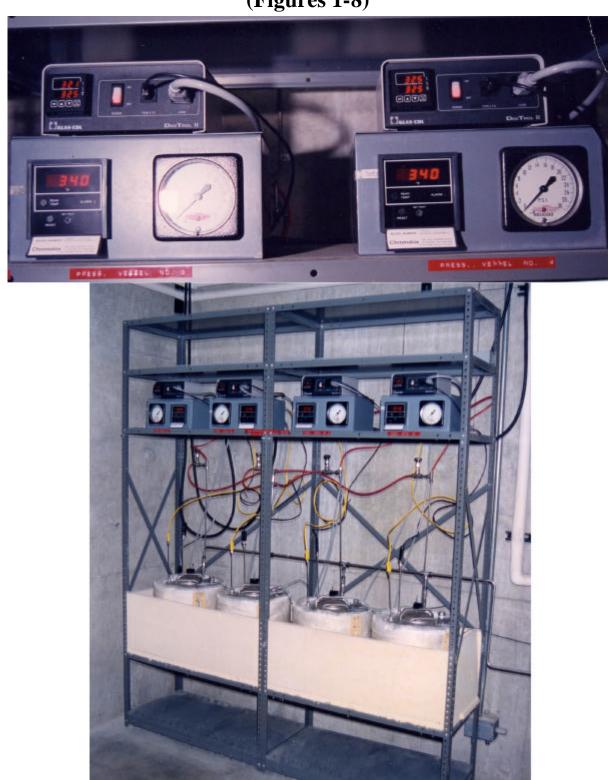
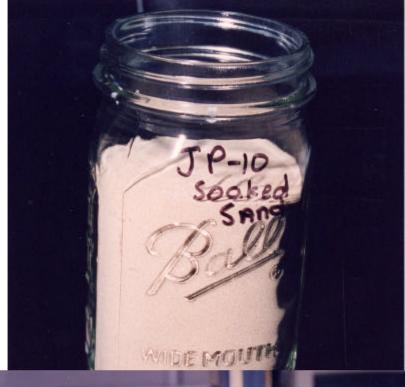


Figure 1: Top: Lower Temperature Controller and Over Temperature Control; Bottom: Pressure Vessels (4 Each)



Fuels Soaked Sand



Figure 2: Typical Material / Fuel Test Configuration



Figure 3: Test Oven Modified with Insert (Explosion Proof) For 325° F Aging of Materials



Figure 3a: Test Oven and Conductivity Meter



Figure 4: Left: "O" Ring Support (5 Rings) Compression Set (Gauge)

Right: "O" Rings & Compression Set Fixture in Jar



Figure 5: Metallics in 3 – 30 ml Beakers (9 each) Ready for 3 Test Fuel Jars (Control, + 100, x4)

FUEL / MATERIAL COMPATIBILITY TEST RESULTS TEST PLAN I.D. NO. MATERIAL / IDENTITY: TEST TEMPERATURE (°F) USE: EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL: TEST DATE START: JP-8 BASELINE FUEL: TEST MATERIAL / FUEL EXPOSURE TEST EVALUATION CRITERIA **EVALUATION OF TEST RESULTS** CONTROL MAT ALLOWABLE TOLERANCE MATERIAL RESULTS COMPARISON TO CONTROL & OVERALL JP8+100 (X4) JP-8 JP-8 +100 MEASURED AT PROPERTY TESTS REOUIREMENT ALLOWABLE REQUIREMENTS EVALUATION AMBIENT TEMP MIN VALUE INCREASE DECREASE JP-8+100 (AVG. 5 SPECIMENS) POST POST POST MAX VALUE JP-8+100 JP8 X4 TENSILE (PSI) **ELONGATION (%) VOLUME SWELL (%)** HARD'S; a) SHORE A (PTS) b) PENCIL COMP. SET (avg. 2 spcm's) LAP SHEAR (PSI) COHESION (%) TAPE ADHESION (P/F) PEEL STRENGTH (LB/IN) LAMINAR SHEAR (PSI) RESISTIVITY (OHM-CM) TORQUE (INCH-LBS.) RUPTURE PRESS. (IN.HG) VISUAL OBSERVATIONS TEST FUEL / MATERIAL EXPOSURE CONTROL FUEL PRE (NEW) VS. POST (STRESSED) 200°F 7 DAYS **FUELS** 4 X 7 DAY PERIODS (28 DAYS) SPECIFICATION RANGE GENERAL PROPERTY TESTS* JP-8 JP-8 +100 JP8+100 (X4) JP-8 JP-8 + 100 JP-8 + 100 x4 FOR JP-8 OBSERVATIONS POST POST POST POST POST PRE POST PRE PRE MIN MAX +100 X4 COLOR (7 DAYS) ACID NO. mgKOH/gm GUMS mg/100ml HYDROPEROXIDES mM/l CONDUCTIVITY pS/m @72°F VISUAL OBSERVATIONS NOTES: C =C1 - C6 = Light to Dark Fuel Color: Clear **Designations:** NE =Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = FailDATE: W =Within Allowable Requirement; O = Outside Allowable Requirement **UDRI TECH:**

Between Material Degradation and Fuel Properties Degradation

A.F. AUT. WL/POSF

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

NSR = No Spec. Req. and/or 4 (x) Additive Concentration

OT =

N/A =

Material Tested Beyond Temperature Range

Not applicable:

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

NON-METALLIC DATA SHEET (SAMPLE)

Figure 6

UDRI ENG:

UDRI P.I. ENG:

A.F. AUT. W./MLSE:

TEST PLAN I.D. NO TEST TEMPERATU EXPOSURE TIME () TEST DATE START	RE (°F) DAYS)				USE TES	: T ADDIT	IDENTII	L:								_
		TEST M	IATERIAL	/ FUEL EXF	OSURE				EV	ΔΙΙΙΔΤ	ION O	F TEST	RESULTS	<u> </u>		
MATERIAL			RESI	ULTS					12 ()	TIL CITT	1011 0.	I ILDI	RESCEIS	n	OVERAL	
PROPERTY TESTS	; -	JP-8 JP-8 +100 JP8+100 (X4)						OBSER	RVATIO	NS ANI	REF	ERENC	E S		/ALUATI	
(AVG. 5 SPECIMEN	-	POST	PRE	POST	PRE	POST		0 2 3 2 1	.,	1,0 111,1				JP8	+100	X4
COLOR	7															
PITTING (VISUAL)																
PITTING (MICROSCOPY)																
AVG. WT. (gms)																
GAIN / LOSS (gms)																
MICROSCOPY EVAL.			<u> </u>	<u></u>	<u> </u>	<u></u>					<u>.</u>				<u> </u>	<u></u>
FUELS PROPERTY TESTS		TEST FUEL / MATERIAL EXPOSURE 4 X 7 DAY PERIODS (28 DAYS)				1 20	J	P-8	JP-8	+ 100 x4	RANGE FOR JP-8	OBS	L ONS			
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)																
CONDUCTIVITY (AVG. of	4) PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F																
GRAPHITE FURN/ICP (PP	B) 7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
																
Fuel Color: Designations: Comparisons:	C = Clear NE = Not E N = Withi OT = Mate N/A = Not a GT = Great	(No Deposit, valuated; in Allowable orial Tested B ipplicable; er than 500 p	Requiremen eyond Temp	C1 - C ND = N nt; perature Ran	6 = Light to Not Detecte ge LT = I	d; BD = E	elow Detect utside Allowa Control	ion P = Pi	o .	1 1 1	DATE: UDRI TEC: UTC ENG: UDRI P.I. E A.F. AUT. V	ENG: W./MLSA:				

METALLIC DATA SHEET (SAMPLE) Figure 7

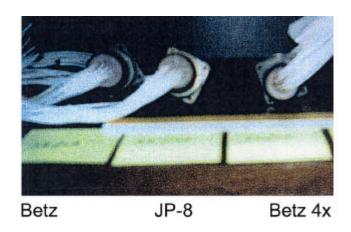


Figure 8: I.P.2.2. Electrical Connectors with Polysulfide Potting Compound MIL-S-8516 Illustrating High Shrinkage Around Electrical Wire Conductor Insulation

VIII. TEST RESULT SUMMARY SHEETS (28 Days / 7 Days)

DHK/UDRI

					0.7	ERA	LLI	EST	EVAI	LUAT	IONI	RESU	LTS	& TE	ST S		J S	
TEST PLAN I.D. No.	AIRCRAFT USE	MILITARY MATERIAL DESIGNATION	TYPE MATERIAL	A	mbien		200 ° F			250 / 275 ° F			325 ° F			400 ° F		
				JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4
I.A.1	Adhesive	Epoxy/Polyamide	Epoxy/Poly- amide				W	w	W									
I.A.2	Adhesive	Vinyl Phenolic	Vinyl Phenolic				w	w	W									
I.A.3	Adhesive	Nitrile Mod. Epoxy	Nitrile	W /	W /	W /	ОТ	ОТ	ОТ									
I.A.4	Adhesive	Mod. Hi. Temp. Epoxy	Epoxy				W	W	W									
I.A.5	Adhesive	Un. Mod. Epoxy	Epoxy				W	W	W									
I.A.6	Adhesive	Primer Nitrile Mod. Epoxy	Nitrile Epoxy				w	w	w									
I.A.7	Adhesive	Primer	Primer				W	W	W									
I.A.8	Adhesive	Primer	Primer				NT	NT	NT									
I.A.9	Adhesive	Coating Explosion ¹ Suppression Foam Adhesive	Nitrile				0	w	W									
I.A.10	Adhesive	Acrylic Adhesive	Acrylic				О	О	0									
I.A.11.1	Adhesive	Filled Epoxy (1:1 mix)	Epoxy				W	W	W									
I.A.11.2	Adhesive	Filled Epoxy (2:1 mix)	Epoxy				W	W	W									

¹ Tested as a coating (tape adhesion and pencil)

 $K\ E\ Y$ $T\ O$ $S\ Y\ M\ B\ O\ L\ S$

W = Within Acceptable Requirement
O = Outside Acceptable Requirement

OT = Tested Beyond Material's Temperature Range
* Denotes 7 - Day Test Data Available

I = Test Planned (Incomplete)
E = Evaluation Incomplete (Tested)

NT = No Test Planned

DHK/UDRI

					0.0	ERA	LLI	EST	EVAI	LUAT	ION	RESU	LTS	& TE	ST S	TATU	J S	
TEST PLAN I.D.No	AIRCRAFT USE	MILITARY MATERIAL DESIGNATION	TYPE MATERIAL	16	0/180 °	F		200 ° F		250	50 / 275 ° F		325 ° F				400 ° F	
				JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4
I.B.1	Fuel Bladder	Innerliner	Nitrile				ОТ	W	W									
I.B.2	Fuel Bladder	Innerliner	Nitrile				ОТ	W	W									
I.B.3	Fuel Bladder	Innerliner	Polyurethane				W	w	w									
I.B.4	Fuel Bladder	Innerliner	Nitrile	W /	W/	W /	от*	OT*	от*									
I.B.5	Fuel Bladder	Innerliner	Polyurethane	W /	0/	0/	от*	OT*	от*									
I.B.6	Fuel Bladder	Self Sealing Innerliner	Nitrile				NT	NT	NT									
I.B.7	Fuel Bladder	Innerliner	Nitrile				от	ОТ	от									
I.B.8	Fuel Bladder	Innerliner	Urethane				от	W	w									
I.B.9	Fuel Bladder	Innerliner	Nitrile				NT	NT	NT									
I.B.10	Fuel Bladder	Repair Material	Polyurethane				NT	NT	NT									
I.B.11	Fuel Bladder	Bladder Cloth	Nylon (36"x60")				W	W	w									
I.B.12	Fuel Bladder	Bladder Cloth	Polyester (42"x48")				W	w	W									
I.B.13	Fuel Bladder	Bladder Cloth	Nylon cloth				ОТ	W	w									
I.B.14	Fuel Bladder	Bladder Cloth	Nylon cloth				W	w	w									
I.B.15	Fuel Bladder	Self Seal	Nitrile				W	W	NT]
I.B.16	Fuel Bladder	Self Sealing	Polyurethane				W	W	NT									

KEY TO SYMBOLS

W = Within Acceptable Requirement 0 =

Outside Acceptable Requirement
Tested Beyond Material's Temperature Range
Denotes 7 - Day Test Data Available OT =

I = Test Planned (Incomplete) E = Evaluation Incomplete (Tested)

NT = No Test Planned

DHK/UDRI

					0.7	ERA	LL 1	EST	EVAI	UAT	ION	RESU	LTS	& TE	ST S	TATU	J S	
TEST PLAN I.D.No	AIRCRAFT USE	MILITARY MATERIAL DESIGNATION	TYPE MATERIAL	120/180 ° F		F	F 200 ° F			250 / 275 ° F				325 ° F	,	400 ° F		
				JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4
I.C.1	Int. Fuel Tank	Coating, MIL-S-4383	Nitrile				o	w	w									
I.C.2	Int. Fuel Tank	Coating, MIL-C-27725	Polyurethane				W*	W*	W*									
I.C.3	Int. Fuel Tank	Coating	Epoxy				w	w	w									
I.C.4 / I.D.2	Int. Fuel Tank	MIL-S-8802	Manganese				w	w	w									
I.C.5	Int. Fuel Tank	New Spray/PreCoat-					W	w	W									
I.C.6	Ground Tank Fuel Storage	Note: Test at 100 ° F 3 part epoxy system MIL- P-24441 A-36 plate steel, lapweld /20 Form 150 Type III /30	Epoxy Polyamide 2-4 mil thick	W/	W/	W/												
		Form 151 Type IV /31 Form 152 Type IV 6010 carbon steel	8-10 mil max thick	W/	W/	W/												

Note: I/ Test at 100 ° F

KEY TO SYMBOLS

W = Within Acceptable Requirement 0 = Outside Acceptable Requirement

Tested Beyond Material's Temperature Range Denotes 7 - Day Test Data Available OT =

I = Test Planned (Incomplete) E = Evaluation Incomplete (Tested) No Test Planned

NT =

DHK/UDRI

					0.0	ERA	LL T	EST	EVAI	LUAT	ION	RESU	LTS	& TE	ST S	TATU	J S	
TEST PLAN I.D.No	AIRCRAFT USE	MILITARY MATERIAL DESIGNATION	TYPE MATERIAL	160/180 ° F			200 ° F				250 / 275 ° F			325 ° F	,	400 ° F		
				JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4
I.D.1	Int. Fuel Tank	Sealant, MIL-S-8802	Dichromate				W	w	W									
I.D.2/I .O.4	Int. Fuel Tank	Sealant, MIL-S-8802F	Manganese				W *	W *	W*									
I.D.3	Int. Fuel Tank	Sealant (C); MIL-S- 83430A	Manganese				W	w	W									
I.D.4	Int. Fuel Tank	Sealant, MIL-S-7502	Lead Dioxide				NT	NT	NT									
I.D.5	Int. Fuel Tank	Sealant, Primer AMS 3375	Fluorosilicone				w	W	w									
I.D.6	Int. Fuel Tank	Spray Sealant AMS 3279	Polyurethane	\mathbf{W}^{1} /	W/	W /	w	w	w									
I.D.7	Int. Fuel Tank	Sealant, AMS 3277	Polythioether				W	W	W									
I.D.8	Int. Fuel Tank	Sealant, AMS 3281	Polysulfide	W/	W/	0/	ОТ	ОТ	от									
I.D.9	Int. Fuel Tank	Sealant, AMS 3265	Polysulfide	W/	W /	0/	ОТ	от	ОТ									
I.D.10	Int. Fuel Tank	Sealant, AMS 3283	Polysulfide				w	w	w									
I.D.11	Int. Fuel Tank	Sealant, MIL-S-85334, Groove Injection	Fluorosilicone				w	W	w									
I.D.12	Int. Fuel Tank	Sealant, Groove Injection	Cynasilicone				NT	NT	NT									

1 Tested 70 days at 140°F

KEY TO SYMBOLS

W = Within Acceptable Requirement
O = Outside Acceptable Requirement

OT = Tested Beyond Material's Temperature Range
* Denotes 7 - Day Test Data Available

I = Test Planned (Incomplete)
E = Evaluation Incomplete (Tested)

NT = No Test Planned

FUEL / MATERIAL TEST RESULT SUMMARY TABLE

JP-8, JP-8 + 100 AND JP 8 + 100 X4 (JP-8 + 100 AND JP-8 + 100 X4 W/BETZ/DEARBORN/8Q462)
TEST DURATION 28 DAYS AT SPECIFIED TEMPERATURES (°F)

DHK/UDRI

					0.0	ERA	LLI	TEST	EVAI	LUAT	ION	RESU	LTS	& TE	ST S	TATU	J S	
TEST PLAN I.D.No	AIRCRAFT USE	MILITARY MATERIAL DESIGNATION	TYPE MATERIAL	16	0/180 9	F		200 ° F		250	7 275	° F	,	325 ° F			400 ° F	
				JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4
I.E.1	Int. Fuel Tank	Composite, AS 4/3501-6	Epoxy Graphite				W *	W *	W *									
I.E.2	Int. Fuel Tank	Composite, IM 7/5250-4	Graphite Bismaliemide				W *	W *	W *									
I.E.3	Int. Fuel Tank	Composite, AS7/8551-7A	Epoxy Graphite				W	w	w									
I.E.4	Vent Lines	Composite	Fiberglass				NT	NT	NT									
I.E.5	Isolator Tube	Composite	Epoxy Resin				NT	NT	NT									

KEY TO SYMBOLS

W = Within Acceptable Requirement 0 =

Outside Acceptable Requirement
Tested Beyond Material's Temperature Range
Denotes 7 - Day Test Data Available OT =

I = Test Planned (Incomplete) E = Evaluation Incomplete (Tested) NT = No Test Planned

DHK/UDRI

					0.0	ERA	LL T	EST	EVAI	LUAT	ION	RESU	LTS	& TE	ST S	TATU	J S	
TEST PLAN I.D.No	AIRCRAFT USE	MILITARY MATERIAL DESIGNATION	TYPE MATERIAL	16	0/180 °	F	:	200 ° F	,	250	/ 275	° F		325 ° F	,		400 ° F	
				JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4
I.F.1 .1 .2	Fuel Filter 11/18/97 11/18/97	AC-B683F-2435 AC-B253F-2435Y1, 1/4	F-100 Eng. F-110 Eng.							W/- W/.	NT	W/- W/						
I.F.2.	Fuel Filter 14 Aug '97	AC-9985F-10	T-700 Eng.							W/ -	NT	W/ -						
I.F.3	Fuel Tank Explosion Suppression	Foam, Yellow Type II, MIL-B-83054	Polyurethane (Ester)				W *	W *	W *									
I.F.4	Fuel Tank Explosion Suppression	Foam, Blue IV, MIL-B-83054	Polyurethane (Ether)				W *	W *	W *									
I.F.5	Fuel Tank Explosion Suppression	Foam (ESM), Charcoal Gray, Class I MIL-F-87260	Polyurethane (Ether)				W *	W *	W*									
I.F.6	Fuel Tank Explosion Suppression	Foam Charcoal Gray, Class II. MIL-F-87260	Polyurethane (Ether)				w	w	w									
I.F.7	Fuel Tank Explosion Suppression	Foam Charcoal Gray, Class II. MIL-F-87260	Polyurethane (Ether)				NT	NT	NT									
I.F.8	Fuel Tank Explosion Suppression	Foam Yellow, Type II, Non- Conductive, MIL-B-83054B	Polyurethane (Ester)				NT	NT	NT									
I.F.9	Fuel Tank Explosion Suppression	Beige (tan), Type II, Non- Cond, MIL-B-83054B	Polyester (Ester)	W/	W /	W/												

KEY TO SYMBOLS

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E = Evaluation Incomplete (Tested)
NT = No Test Planned

DHK/UDRI

					0.0	ERA	LL T	EST	EVAI	LUAT	IONI	RESU	LTS	& TE	ST S	TATU	J S	
TEST PLAN I.D.No	AIRCRAFT USE	MILITARY MATERIAL DESIGNATION	TYPE MATERIAL	16	0/180	F	;	200 ° F		250	/ 275	° F		325 ° F	,		400 ° F	1
				JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4
I.G.1	Plumbing Gasket	"O" Ring,, MIL-P-83461 (Hydraulic)	Nitrile	0/	Ο/	0/	o	О	0									
I.G.2	Plumbing Gasket	"O" Ring, MIL-P-25732 (Hydraulic)	Nitrile	0/	0/	0/	0*	0*	0*									
I.G.3	Plumbing Gasket	"O" Ring, MIL-P-5315	Nitrile	O/ OT	W/ OT	W/ OT	от	ОТ	ОТ				от	от	от			
I.G.4	Plumbing Gasket	"O" Ring, AMS-7271 / MS9201	Nitrile	W /	W/	W/	ОТ	ОТ	ОТ									
I.G.5 (II.G.2)	Plumbing Gasket	"O" Ring, MIL-R-25988	Fluorosilicone				W *	W *	W *	(OT/)	(W/)	(W/)	(OT)*	(OT)*	(OT)*			
I.G.6 (II.G.9)	Plumbing Gasket	"O" Ring, MIL-R-83248	Fluorocarbon				W *	W *	W *				(O)	(W)	(O)			
I.G.7 (II.G.3)	Plumbing Gasket	"O" Ring MIL-R-83485	Fluorocarbon				w	w	w				(W)*	(W)*	(W)*	(W)	(W)	(W)
I.G.8 (II.G.4)	Plumbing Gasket	"O" Ring, AMS-7257A	Perfluoro- elastomer				W¹	W¹	W¹				(0)*	(W)*	(W)*			
I.G.9	Plumbing Gasket	"O" Ring	Type S Nitrile	0/	W/	W/	ОТ	ОТ	ОТ									
I.G.10 (II.G.1)	Plumbing Gasket	"O" Ring, MIL-R-25988	Fluorosilicone				NT	NT	NT									
I.G.11 (II.G.10)	Plumbing Gasket	Washer, Seal	Urethane	W/	W/	W/	ОТ	ОТ	ОТ									
I.G.12 (II.G.11)	Plumbing Gasket	Tang, Seal	Urethane				w	w	w				(OT)	(OT)	(OT)			
I.G.13	Plumbing Gasket	Cork, Seal	Cork				w	W	w									

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NT = No Test Planned

DHK/UDRI

					0.7	ERA	LL 1	EST	EVAI	LUAT	ION	RESU	LTS	& TE	ST S	TAT	U S	
TEST PLAN I.D.No	AIRCRAFT USE	MILITARY MATERIAL DESIGNATION	TYPE MATERIAL	16	0/180 °	F		200 ° F	,	250	7 275	° F		325 ° I	י		400 ° F	1
				JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4
II.G.1 (I.G.10)	Engine Plumbing	"O" Ring, MIL-R-25988	Fluorosilicone				(NT)	(NT)	(NT)	/OT	/OT	/OT	ОТ	ОТ	ОТ			
II.G.2 (I.G.5)	Engine Plumbing	"O" Ring, MIL-R-25988	Fluorosilicone				(W)*	(W)*	(W)*	OT/	W/	W /	от*	от*	от*			
II.G.3 (I.G.7)	Engine Plumbing	"O" Ring, MIL-R-83485 (Low Temp. Material)	Fluorocarbon				(W)	(W)	(W)				w	W	w	w	w	W
II.G.4 (I.G.8)	Engine Plumbing	"O" Ring AMS7257A	Perfluoro- elastomer				(W) ¹	(W) ¹	(W) ¹				w	W	w			
II.G.5	Engine Plumbing	"O" Ring, MIL-R-25988	Fluorosilicone							/OT	/OT	/OT	OT ¹	OT ¹	OT ¹			
II.G.6	Engine Plumbing	"O" Ring, MIL-R-83485	Fluorocarbon										w	W	w	от	ОТ	ОТ
II.G.7	Engine Plumbing	"O" Ring, MIL-R-25988	Fluorosilicone										от*	ОТ*	от*			
II.G.8	Engine Plumbing	"O" Ring, AMS 7257A	Perfluoro- elastomer										o	o	o			
II.G.9 (I.G.6)	Engine Plumbing	"O" Rings, MIL-R-83248	Fluorocarbon				(W)*	(W)*	(W)*				o	W	o			
II.G.10 (I.G.11)	Plumbing Gasket	Washer, Seal	Urethane (See I.G.11)	(W)/	(W)/	(W)/	(OT)	(OT)	(OT)				от	ОТ	от			
II.G.11 (I.G.12)	Plumbing Gasket	Tang, Seal	(see I.G.12)				(W)	(W)	(W)				от	ОТ	от			

KEY TO SYMBOLS

 $\begin{array}{lll} W = & & \text{Within Acceptable Requirement} \\ O = & & \text{Outside Acceptable Requirement} \end{array}$

OT = Tested Beyond Material's Temperature Range
* Denotes 7 - Day Test Data Available

I = Test Planned (Incomplete) E = Evaluation Incomplete (Tested)

NT = No Test Planned

DHK/UDRI

					0.7	VERA	LLI	EST	EVAI	LUAT	ION	RESU	LTS	& TE	ST S	TATU	JS	
TEST PLAN I.D.No	AIRCRAFT USE	MILITARY MATERIAL DESIGNATION	TYPE MATERIAL	16	0/180	F		200 ° F	ı	250) / 275	° F		325 ° F	•		400 ° F	
				JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4
II.G.12	Plumbing Gasket	"O" Ring, MIL-R-83485	Fluorocarbon (Improved 777)										W ¹	\mathbf{W}^{1}	W¹	W ¹	\mathbf{W}^{1}	W¹
II.G.13	Plumbing Gasket	"O" Ring, MIL-R-25988	Fluorosilicone 677				W	W	W				ОТ	ОТ	ОТ			
II.G.14	Plumbing Gasket	"O" Ring, MIL-R-25988	Fluorosilicone (Teflon TM)	/W	/W	/W	NT	NT	NT				NT	NT	NT			
II.G.15	Plumbing Gasket	"O" Ring, MIL-R-25988	Fluorosilicone (Teflon TM)				W	W	W				NT	NT	NT			

Note: No Compression Set / Volume Swell / Hardness

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Tested Beyond Material's Temperature Range Denotes 7 - Day Test Data Available OT =

1 = Test Planned (Incomplete) Evaluation Incomplete (Tested)

No Test Planned

FUEL / MATERIAL TEST RESULT SUMMARY TABLE

JP-8, JP-8 + 100 AND JP 8 + 100 X4 (JP-8 + 100 AND JP-8 + 100 X4 W/BETZ/DEARBORN/8Q462)
TEST DURATION 28 DAYS AT SPECIFIED TEMPERATURES (°F)

DHK/UDRI

					0.0	ERA	LL T	EST	EVAI	LUAT	IONI	RESU	LTS	& TE	ST S	TATU	J S	
TEST PLAN I.D.No	AIRCRAFT USE	MILITARY MATERIAL DESIGNATION	TYPE MATERIAL	16	0/180	F	:	200 ° F		250	/ 275	° F	;	325 ° F		,	400 ° F	
				JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4
I.H.1	Hose	Self-Sealing					NT	NT	NT									
I.H.2	Hose Aerial Refueling Tanker	MIL-H-4495	Acrylic/Nitrile	W/	NT	NT	ОТ	ОТ	ОТ									
I.H.3	Hose (Ground Refueling)	MIL-H-370	Nitrile	W/			ОТ	ОТ	ОТ									
I.H.4	Hose (Navy Aircraft Carrier)	MIL-H-17902	Nitrile	W/			ОТ	ОТ	ОТ									
I.H.5	Hose (Ground Refueling)	MIL-H-26521	Epichlorohydrin				ОТ	W	w									

KEY TO SYMBOLS

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Outside Acceptable Requirement
Tested Beyond Material's Temperature Range
Denotes 7 - Day Test Data Available OT =

I = Test Planned (Incomplete) E = Evaluation Incomplete (Tested)

NT = No Test Planned

DHK/UDRI

					0.0	ERA	LLI	EST	EVAI	UAT	ION	RESU	LTS	& TE	ST S	TATU	J S	
TEST PLAN I.D.No	AIRCRAFT USE	MILITARY MATERIAL DESIGNATION	TYPE MATERIAL	16	0/180 °	F	:	200 ° F		250	/ 275	° F	;	325 ° F	7		400 ° F	
				JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4
I.I. 1	Insulation/ Electrical Wire /Clamps/Misc.	Teflon	TFE (Teflon) (Film)				w	W	W									
I.I.2	Insulation/ Electrical Wire/ Clamps/Misc.	ASTM D 4066	Nylon 101 Film OLD (Film)	Ο/	W /	W /	o	o	0									
			NEW Film				О	W	W									
I.I.3	Insulation/ Electrical Wire /Clamps/Misc.	Polyethylene Film	Polyethylene (HDP) (Film)				0	w	W									
I.I.4	Insulation/ Electrical Wire /Clamps/Misc.	UPILEX	Kapton (Film)				W	w	W									
I.I.5	Insulation/ Electrical Wire /Clamps/Misc.	Marmon clamp	KKK-125 (Pacific Molded)				NT	NT	NT									
I.I.6	Insulation/ Electrical Wire /Clamps/Misc.	MIL-I-7444 Type 1	Vinyl Plastic	0/	NT/	NT/	O	o	0									
I.I.7	Fuel Line Clamps & Electrical Ties	Kynar					W	w	W									
I.I.8	Bladder Tanks	See I.B.11, 12, 13, 14	Nylon Cloth				N/A	N/A	N/A									
I.I.9	Engine Fuel Control Stepper Motor	Magnetic Wire Insulation Type I	HML Varnish										CN	w	w			
I.I.10	Wire Insulation	Teflon / Kapton	Hybrid Teflon / Kapton (Wire)				W	W	W									
I.I.11	Wire Bundle Wrap	Shrink Wrap					NT	NT	NT									
I.I.12	Wire Insulation	Teflon Insulation, Wire Insulation	Wire				W	W	W									
I.I.13	Wire Insulation	Nylon Insulation, Wire Insulation	Wire				W	W	W									
I.I.13.1	Wire	Nylon Wire, Coax Shield	Wire				W	W	W									

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NT = No Test Planned

DHK/UDRI

mn.am					0.0	ERA	LL T	TEST :	EVAl	LUAT	ION	RESU	LTS	& TE	ST S	TATU	J S	
TEST PLAN I.D.No	AIRCRAFT USE	MILITARY MATERIAL DESIGNATION	TYPE MATERIAL	16	0/180 °	F		200 ° F		250) / 275	° F		325 ° I	r		400 ° F	
				JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4
I.J.1	Joining Material	2219-T87 (AL), Welded	UNS A 92319 4191D9 (AMS)				CN	w	W									
I.J.2	Joining Material	6AL-4V (Ti), Welded	Match Fill										CN	W	\mathbf{W}			
I.J.3	Joining Material	3AL-2.5V (Ti), Welded	Match Fill										CN	W	W			
I.J.4	Joining Material	Inco 718 (Ni), Welded	Match Fill				CN	W	W				CN	W	W			
I.J.5	Joining Material	Inco 625 (Ni), Welded	Match Fill										CN	W	W			
I.J.6	Joining Material	321 (SS), Welded	Match Fill				CN	W	W				CN	W	W			
I.J.7	Joining Material	IN200/201, Welded	Match Fill										CN	W	W			
I.J.8	Joining Material	IN200/201, Welded	BNI (5 or 6)										CN	W	W			
I.J.9	Joining Material	Waspalloy (Ni), Brazed	AMS 4786 Ag										CN	W	W			
I.J.10	Joining Material	321 SS, Brazed	B Ag (5 or 6)										CN	W	W			
I.J.11	Joining Material	QQ-S-571,SN60 (Tin 60%, Lead 40%), B-36-21A	Tin & Lead (Solder Spots)				CN	w	W				от	от	от			
I.J.12	Joining Material	6061 T-6 MIL-B-7883 Type V. Grade B, Dip Braze	4145 or 4147 fill				CN	w	w									
I.J.13	Joining Material	Ti, Cu, Ni Braze P & W	Ti, Cu, Ni										CN	W	W			
I.J.14	Joining Material	6061-T6 Welded with 4043 filler	Aluminum				CN	w	W				CN	W	W			
I.J.15	Joining Material	5052 H-34 Welded w/ 6061T6 w/ 5356 Filler	Aluminum				CN	w	w									
I.J.16	Joining Material	Sn 95, Sb05 Base Material, B 36-21A	Copper w/Solder Spots				CN	w	w									

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NT = No Test Planned

DHK/UDRI

					0.7	ERA	LLI	EST	EVA	LUAT	ION	RESU	LTS	& TE	ST S	TATU	J S	
TEST PLAN I.D.No	AIRCRAFT USE	MILITARY MATERIAL DESIGNATION	TYPE MATERIAL	16	0/180 °	F		200 ° F	•	250) / 275	° F		325 ° F	,		400 ° F	ı
				JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4
I.K.1.1	Airframe, Coatings	Cover Ink Stamp, EC 776, Top Coating QQ-A- 25011	(1 per test fuel)				W	W	W									
.2							\mathbf{W}	W	W									
.3							W	W	W									
I.K.2	Airframe, Coatings	Dry Film Lubricant, Dicronite DoD-L-85645	Dicronite				NT	NT	NT									
I.K.3	Airframe, Coatings	Dry Thread Lubricant	Graphite				NT	NT	NT									
I.K.4	Airframe, Coatings	Name Plate, QQ-A-250/1, Color A11136 (Fed Std- 596)					w	W	W									
I.K.5	Airframe, Coatings	Dry Film Lubricant	Molybdenum Disulfide				NT	NT	NT									
I.K.6a	Airframe, Coatings		Aluminum Varnish				NT	NT	NT									
I.K.6b	Airframe, Coatings	Resin					NT	NT	NT									

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DHK/UDRI

					0.7	ERA	LLI	EST	EVA	LUAT	ION	RESU	LTS	& TE	ST S	TATU	J S	
TEST PLAN I.D.No	AIRCRAFT USE	MILITARY MATERIAL DESIGNATION	TYPE MATERIAL	16	0/180	F	:	200 ° F	,	250	/ 275	° F		325 ° I	,		400 ° F	
				JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4
I.K.6c	Airframe, Coatings	Reducer: Spec. No. 66-C-28					NT	NT	NT									
I.K.7	Airframe, Coatings	Pump, Carbon Bearing,	SS, 410, RC 26- 34, AMS 5613				w	W	W									
I.K.8.1	Airframe, Coatings	Pump Carbon Bearing	OP-658 (Carbon)										NT	NT	NT			
I.K.8.2	Airframe, Coatings	Pump Carbon Bearing	Bearings										W	W	W			
I.K.8.3	Airframe Coatings	Pump Carbon Bearing	Bearings										W	W	W			
I.K.9	Airframe, Coatings	Seal, MIL-L-46010B, Type I	Sliding Seal				NT	NT	NT									
I.K.10.1	Airframe, Qty. Probe	Probe	Coating				I_2	\mathbf{I}_2	\mathbf{I}_2									
I.K.10.2	Airframe, Qty. Probe	Fuel Quantity Probe	Coating				I_2	I_2	\mathbf{I}_2									
I.K.11.1	Airframe, Qty. Probe	Fuel Quantity Probe	Coating				\mathbf{I}_2	\mathbf{I}_2	\mathbf{I}_2									
I.K.11.2	Airframe, Qty. Probe	Fuel Quantity Probe	Coating				I_2	I_2	I_2									
I.K.12	Airframe, Qty, Probe	Fuel Quantity Probe, Material	Polyphenylene Sulfide 40% glass filled				W	W	W									

Note: $I_2 = To Be Tested As An Assembly in a Follow-on Program$

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FUEL / MATERIAL TEST RESULT SUMMARY TABLE

JP-8, JP-8 + 100 AND JP 8 + 100 X4 (JP-8 + 100 AND JP-8 + 100 X4 W/BETZ/DEARBORN/8Q462)
TEST DURATION 28 DAYS AT SPECIFIED TEMPERATURES (°F)

DHK/UDRI

					0.0	ERA	LLI	EST	EVAI	LUAT	ION	RESU	LTS	& TE	ST S	TATU	J S	
TEST PLAN I.D.No	AIRCRAFT USE	MILITARY MATERIAL DESIGNATION	TYPE MATERIAL	16	0/180	F		200 ° F		250) / 275	° F		325 ° F	,		400 ° F	
				JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4
I.L.1	Locking Devices	Threadlock, MIL-S- 22473 Grade A or AV,	Cyanoacrilicate				w	w	w									
I.L.2	Locking Devices	Threadlock, MIL-S- 22473, (Red)	Cyanoacrilicate				W	w	W									
I.L.3	Locking Devices	Threadlock, MIL-S- 22473 (Brown)	Cyanoacrilicate				w	w	W									
I.L.4	Locking Devices	Lockwire, See Metals Category (I.M.19/II.M.10)	AMS 5688H wire (30302)				N/A	N/A	N/A									

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FUEL / MATERIAL TEST RESULT SUMMARY TABLE

JP-8, JP-8 + 100 AND JP 8 + 100 X4 (JP-8 + 100 AND JP-8 + 100 X4 W/BETZ/DEARBORN/8Q462)
TEST DURATION 28 DAYS AT SPECIFIED TEMPERATURES (°F)

DHK/UDRI

					7.0	ERA	LLI	EST	EVAI	LUAT	ION	RESU	LTS	& TE	ST S	TATU	J S	
TEST PLAN I.D.No	AIRCRAFT USE	MILITARY MATERIAL DESIGNATION	TYPE MATERIAL	16	0/180°	F	:	200 ° F		250) / 275	° F		325 ° F			400 ° F	
				JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4
I.M.1	Airframe, Tank, & Plumbing	5052-0 Bare	Aluminum				CN	W	W				CN	W	W			
I.M.2	Airframe, Tank, & Plumbing	6061-T4 Bare	Aluminum				CN	W	W				ОТ	ОТ	ОТ			
I.M.3	Airframe, Tank, & Plumbing	6061-T6 Bare	Aluminum				CN	W	W				CN	w	W			
I.M.4	Airframe, Tank, & Plumbing	7075-T6 Chromic Acid Anodize	Aluminum				CN	W	W				ОТ	ОТ	ОТ			
I.M.5	Airframe, Tank, & Plumbing	7075-T6 Alodine/200	Aluminum				CN	w	W				ОТ	ОТ	ОТ			
I.M.6	Airframe, Tank, & Plumbing	7075-T6 Bare	Aluminum				CN	W	W				ОТ	ОТ	ОТ			
I.M.7	Airframe, Tank, & Plumbing	2024-T3 Bare	Aluminum				CN	w	W				CN	w	W			
I.M.8	Airframe, Tank, & Plumbing	2219-T87 Bare	Aluminum				CN	w	W				ОТ	ОТ	ОТ			
I.M.9	Airframe, Tank, & Plumbing	3003 Bare	Aluminum				CN	W	W				CN	W	W			
I.M.10 (II.M.19)	Airframe, Tank, & Plumbing	C-355-T6	Aluminum				CN	w	W									
I.M.11 (II.M.20)	Airframe, Tank, & Plumbing	C-356-T6	Aluminum				CN	w	W									
I.M.12	Airframe, Tank, & Plumbing	7050-T74	Aluminum				CN	w	W									
I.M.13 *II.M.13)	Airframe, Tank, & Plumbing	316	Stainless Steel				CN	W	W									
I.M.14 (II.M.14)	Airframe, Tank, & Plumbing	321	Stainless Steel				CN	W	W									

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Tested Beyond Material's Temperature Range
Denotes 7 - Day Test Data Available OT =

I = Test Planned (Incomplete) E = Evaluation Incomplete (Tested)

NT = No Test Planned

JP-8, JP-8 + 100 AND JP 8 + 100 X4 (JP-8 + 100 AND JP-8 + 100 X4 W/BETZ/DEARBORN/8Q462)
TEST DURATION 28 DAYS AT SPECIFIED TEMPERATURES (°F)

DHK/UDRI

				OVERALL TEST EVALUATION RESULTS & TEST STATUS TYPE MATERIAL 160/180 ° F 200 ° F 250 / 275 ° F 325 ° F 400 ° F														
TEST PLAN I.D.No	AIRCRAFT USE	MILITARY MATERIAL DESIGNATION	TYPE MATERIAL	16	0/180	F		200 ° F		250) / 275	° F		325 ° I	,		400 ° F	
				JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4
I.M.15 II.M.12)	Airframe, Tank, & Plumbing	304	Stainless Steel				CN	W	W									
I.M.16 (II.M.6)	Airframe, Tank, & Plumbing	INCO 718	Nickel				CN	W	W									
I.M.17 (II.M.11)	Airframe, Tank, & Plumbing	440C	Stainless Steel				CN	w	W									
I.M.18 (II.M.8)	Airframe, Tank, & Plumbing	347	Stainless Steel				CN	w	W									
I.M.19 (II.M.10	Airframe, Tank, & Plumbing	AMS, 5688H (Wire) (Lockwire)	Stainless Steel				CN	w	W									
I.M.20 (II.M.24)	Airframe, Tank, & Plumbing	17-4 Ph AMS 5604/5643	Stainless Steel				CN	w	w									
I.M.21	Airframe, Tank, & Plumbing	1010 Cadmium Plate (Class 2)	Ferrous										CN	W	W			
I.M.22	Airframe, Tank, & Plumbing	1010 Zinc	Ferrous										CN	W	W			
I.M.23	Airframe, Tank, & Plumbing	4130 Cadmium Plate (Class II)	Ferrous				CN	W	w				CN	W	W			
		Type 2, Gold																
I.M.24 (II.M.1)	Airframe, Tank, & Plumbing	6AL-4V	Titanium				CN	W	W									
I.M.25	Airframe, Tank, & Plumbing	950 Bronze Aluminum	Copper/AL				CN	W	W				CN	W	W			
I.M.26A	Airframe, Tank, & Plumbing	Naval Brass	Copper/Nickel 70-30				CN	W	w									
I.M.26B	Airframe, Tank, & Plumbing	Naval Brass	Copper/Nickel 90-10				CN	W	w									
I.M.27	Airframe, Tank, & Plumbing	Brass, Sheet 268 Substitute 260	Copper	CN/	W/	W/	CN	W	w				CN	w	w			
		Substitute 200																

KEY TO SYMBOLS

W = Within Acceptable Requirement 0 = Outside Acceptable Requirement

Tested Beyond Material's Temperature Range Denotes 7 - Day Test Data Available OT =

I = Test Planned (Incomplete) E = Evaluation Incomplete (Tested) NT = No Test Planned

JP-8, JP-8 + 100 AND JP 8 + 100 X4 (JP-8 + 100 AND JP-8 + 100 X4 W/BETZ/DEARBORN/8Q462)
TEST DURATION 28 DAYS AT SPECIFIED TEMPERATURES (°F)

DHK/UDRI

											ION	RESU	LTS	& TE	ST S	TATU	J S	
TEST PLAN I.D.No	AIRCRAFT USE	MILITARY MATERIAL DESIGNATION	TYPE MATERIAL	TERIAL 160/180 ° F 200 ° F 250 / 275 ° F JP8 +100 x4 JP8 +100 x4 JP8 +100 x CN W W W W W W Im				° F		325 ° F			400 ° F					
				JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4
I.M.28	Airframe, Tank, & Plumbing	Lead, AMS 4751/4750	Lead				CN	w	W				CN	W	W			
I.M.29	Airframe, Tank, & Plumbing	Barium, Ferrite (Shaw Aerospace)	Barium	CN/	W/	W/	OT ¹	OT1	OT1				OT ¹	OT1	OT ¹			
I.M.30	Airframe, Tank, & Plumbing	Neo-dymium (Shaw Aerospace)	(1 per fuel)				CN	W	W				CN ¹	W¹	W¹			
I.M.31	Airframe, Tank, & Plumbing	Brass Sheet, B36-91A	Copper				CN	W	w				CN	W	W			
I.M.32	Airframe, Tank, & Plumbing	1010 Bare	Ferrous				CN	W	w				CN	W	W			
I.M.33	Airframe, Tank, & Plumbing	B-29	Soft Lead				CN	W	w									
I.M.34 (II.M.27)	Airframe, Tank, & Plumbing	Monel 400, Sheet	Nickel/Copper				NT	NT	NT				(CN)	(W)	(W)			
I.M.35	Airframe, Tank, & Plumbing	15-5 PH	Ferrous Cr, Ni, Cu										CN	W	W			
I.M.36	Airframe, Tank, & Plumbing	5052-H34	Aluminum				CN	W	W									
I.M.37 I.M.23	Airframe, Tank, & Plumbing	4130 Cadmium Plate (Class II, Type 2, Gold)	Ferrous										CN	w	W			
I.M.38	Airframe, Tank, & Plumbing	1045 Bare	Ferrous										CN	W	W			
I.M.39	Airframe, Tank, & Plumbing	Magnesium AZ91 T-6 (Substitute AZ31-H24)	Magnesium				CN	w	W									
I.M.40	Airframe, Tank, & Plumbing	4130 Bare	Ferrous, Steel										CN	W	W			
I.M.41	Airframe, Tank, & Plumbing	SN 95, SbO5 Wire 0.20"	Solder (0.020)				CN	W	W									
I.M.42	Airframe, Tank, & Plumbing	2014T6 AMS 4029	Aluminum				CN	W	W									
I.M.43	Airframe, Tank, & Plumbing	4340 , AMS6415 280KSI Tensile	Steel Bar Stock										CN	W	W			

Magnetic Properties Significant Loss

KEY TO SYMBOLS

W = Within Acceptable Requirement 0 = Outside Acceptable Requirement

Tested Beyond Material's Temperature Range Denotes 7 - Day Test Data Available OT =

1 = Test Planned (Incomplete) E = Evaluation Incomplete (Tested)

NT = No Test Planned

JP-8, JP-8 + 100 AND JP 8 + 100 X4 (JP-8 + 100 AND JP-8 + 100 X4 W/BETZ/DEARBORN/8Q462) TEST DURATION 28 DAYS AT SPECIFIED TEMPERATURES (°F)

DHK/UDRI

					0.0	ERA	LLI	EST :	EVAI	UAT	ION	RESU	LTS	& TE	ST S	ТАТ	J S	
TEST PLAN I.D.No	AIRCRAFT USE	MILITARY MATERIAL DESIGNATION	TYPE MATERIAL					200 ° F		250) / 275	° F		325 ° F	,		400 ° F	
				JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4
II.M.1 (I.M.24)	Eng. Fuel lines & Components	6AL-4V	Titanium										CN	W	W			
II.M.2	Eng. Fuel lines & Components	3AL-2.5V (Tubing)	Titanium				CN	W	W				CN	W	W	CN	W	W
II.M.3	Eng. Fuel lines & Components	Hastalloy	Nickel				CN	w	W				CN	w	W			
II.M.4	Eng. Fuel lines & Components	Waspalloy	Nickel				CN	w	W				CN	w	W			
II.M.5	Eng. Fuel lines & Components	INCO 625	Nickel				CN	w	W				CN	w	W			
II.M.6 (I.M.16)	Eng. Fuel lines & Components	INCO 718	Nickel				CN	w	W				CN	w	w			
II.M.7	Eng. Fuel lines & Components	Stellite 30	Chromium/ Carbide										CN	W	w			
II.M.8 (I.M.18)	Eng. Fuel lines & Components	347	Stainless Steel										CN	w	W			
II.M.9	Eng. Fuel lines & Components	Greek Ascolloy (30302)	Ferrous				CN	w	W				CN	w	w			
II.M.10 (I.M.19)	Eng. Fuel lines & Components	AMS 5688H (S.S. Wire) (30302)	Ferrous										CN	W	W			
II.M.11 (I.M.17)	Eng. Fuel lines & Components	440C	Stainless Steel										CN	w	W			
II.M.12 (I.M.15)	Eng. Fuel lines & Components	304	Stainless Steel										CN	w	W			
II.M.13 (I.M.13)	Eng. Fuel lines & Components	316	Stainless Steel										CN	W	W			

KEY TO SYMBOLS

W = Within Acceptable Requirement 0 =

Outside Acceptable Requirement
Tested Beyond Material's Temperature Range
Denotes 7 - Day Test Data Available OT =

I = Test Planned (Incomplete) E = Evaluation Incomplete (Tested)

NT = No Test Planned

FUEL / MATERIAL TEST RESULT SUMMARY TABLE JP-8, JP-8 + 100 AND JP 8 + 100 X4 (JP-8 + 100 AND JP-8 + 100 X4 W/BETZ/DEARBORN/8Q462) TEST DURATION 28 DAYS AT SPECIFIED TEMPERATURES (°F)

DHK/UDRI

TEST PLAN I.D.No	AIRCRAFT USE	MILITARY MATERIAL DESIGNATION	TYPE MATERIAL	16	0/180	F		200 ° F		250	/ 275	° F		325 ° F	1		400 ° F	1
				JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4
II.M.14 (I.M.14)	Eng. Fuel lines & Components	321	Stainless Steel										CN	W	W			
II.M.15	Blank	Blank	Blank															
П.М.16	Eng. Fuel lines & Components	ASI 51410 SS (AMS 5504-J)	Stainless Steel										CN	w	W			
II.M.17 (II.M.11) (I.M.17)	Eng. Fuel lines & Components	440C AMS 5630 Duplicate, See II.M.11	Steel										CN	W	W			
П.М.18	Eng. Fuel lines & Components	CPM 10-V	Powder Metallurgy rolled Fe, V, Cr, C, Mn, Si, T, S, Mo										CN	W	W			
II.M.19 (I.M.10)	Eng. Fuel lines & Components	C-355 T6	Aluminum										CN	w	W			
II.M.20 (I.M.11)	Eng. Fuel lines & Components	C-356 T6	Aluminum										CN	w	W			
II.M.21	Eng. Fuel lines & Components	A-286 AMS 5525 Silver Plate (2410)	Ferrous				CN	W	W				CN	W	W			
II.M.22	Eng. Fuel lines & Components	135 Modified (MIL-S- 6709 AMS 6470 J)	Nitralloy				CN	W	W				CN	W	W			
II.M.23 .1	Eng. Fuel lines & Components	Bronze, Leaded (Tap MS 285) .1) Saw Cut, Cut up Bearing	Copper	CN**/	W**/	W**/	CN	W	W				CN	W	W			
.2		.2) Polished Cylinder	Polished Cylinder Dry Lub End	CN ^{Nok} /	W**/	W**/	CN	W	W				CN	W	W			
.3		.3) Coated Cylinder (Indium)	Indium Cyl. Surf. Dry Lub End										CN	W	w			
.4	iont Tomporoture th	.4) Coated Cylinder (Indium)	Indium All Cu Surf. Dry Lub End										CN	W	W	CN	W	W

^{**} Ambient Temperature, this material only

KEY TO SYMBOLS

W = Within Acceptable Requirement
O = Outside Acceptable Requirement

OT = Tested Beyond Material's Temperature Range
* Denotes 7 - Day Test Data Available

E = Evaluation Incomplete (Tested)
NT = No Test Planned

Test Planned (Incomplete)

CN = Control

1 =

JP-8, JP-8 + 100 AND JP 8 + 100 X4 (JP-8 + 100 AND JP-8 + 100 X4 W/BETZ/DEARBORN/8Q462)
TEST DURATION 28 DAYS AT SPECIFIED TEMPERATURES (°F)

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					0.0	ERA	LLI	EST	EVAI	LUAT	ION	RESU	LTS	& TE	ST S	TATU	J S	
TEST PLAN I.D.No	AIRCRAFT USE	MILITARY MATERIAL DESIGNATION	TYPE MATERIAL	16	0/180 °	F	;	200 ° F		250	/ 275	° F		325 ° F			400 ° F	
				JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4
II.M.24 (I.M.20)	Eng. Fuel Line & Components	17-4 PH Stainless Steel AMS 5604c	Ferrous (S.S.)										CN	w	W			
II.M.25	Eng. Fuel Line & Components	IN 200 Nickel	Nickel				CN	w	W				CN	W	W			
II.M.26	Eng. Fuel lines & Components	Augmentor Spray Bar	Stainless Steel Nr,Ci,Co,Au Braze Nozzles										CN	w	W			
II.M.27 (I.M.34)	Eng. Fuel lines & Components	Monel 400, Sheet	Nickel Copper										CN	w	W			
II.M.28	Eng. Fuel lines & Components	Incoloy 909	Ni, Co, Fe										CN	W	W			
II.M.29	Eng. Fuel lines & Components	Titanium 6-2-4-2 (4919C) Sheet	Titanium										CN	w	w			
П.М.30	Eng. Fuel lines & Components	Haynes 188	Co, Cr, Ni										CN	W	W			
II.M.31	Eng. Fuel lines & Components	Haynes 214	Ni, Cr, Fe, Al										NT	NT	NT			
II.M.32.1	Eng. Fuel lines & Components	AMS 7902B AlBeMet 162 Reactive Material Sheet &	.1) as cast alloy (310)										CN	w	W			
П.М.32.2		Plate, Beryllium Alloy	.2) investment cast high strength alloy with machined surfaces (157)										CN	w	W			
П.М.32.3			.3) AM 162 rolled Standard grind finish										CN	w	w			
П.М.33	Eng. Fuel lines & Components	UNS C17200 Be Cu Spring	Cu, Be										CN	W	W			

KEY TO SYMBOLS

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Tested Beyond Material's Temperature Range
Denotes 7 - Day Test Data Available 0 = OT =

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JP-8, JP-8 + 100 AND JP 8 + 100 X4 (JP-8 + 100 AND JP-8 + 100 X4 W/BETZ/DEARBORN/8Q462)
TEST DURATION 28 DAYS AT SPECIFIED TEMPERATURES (°F)

DHK/UDRI

			OVERALL TEST EVALUATION RESULTS & TEST STATUS IAL TYPE															
TEST PLAN I.D.No	AIRCRAFT USE	MILITARY MATERIAL DESIGNATION	TYPE MATERIAL	16	0/180 °	F	20	0/225 °	F	250) / 275	° F		325 ° F	,		400 ° F	1
				JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4
II.M.34	Eng. Fuel lines & Components	DB Inconel 718 Diffusion Bonded	Ni,Cr										CN	w	w	NT	NT	NT
II.M.35	Eng. Fuel lines & Components	SIC Reinforced Ti, MMC	Titanium, MMC										CN	w	w			
П.М.36	Eng. Fuel lines & Components	Ti-8Al-1Mo-1V	Titanium										CN	W	w			
II.M.37	Eng. Fuel lines & Components	Ion Vapor Deposit IVD onto 4130	4130 Steel, Fe, Cr, Mo										CN	w	w			
II.M.38	Eng. Fuel lines & Components	52100 AMS644H	Steel										NT	NT	NT			
II.M.39	Eng. Fuel lines & Components	8620 AMS6277E	Steel										NT	NT	NT			
II.M.40	Eng. Fuel lines & Components	303 Stainless	Steel										CN	W	w			
П.М.41	Eng. Fuel lines & Components	TI-CP-70	Titanium										CN	W	W			

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Tested Beyond Material's Temperature Range
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JP-8, JP-8 + 100 AND JP 8 + 100 X4 (JP-8 + 100 AND JP-8 + 100 X4 W/BETZ/DEARBORN/8Q462)
TEST DURATION 28 DAYS AT SPECIFIED TEMPERATURES (°F)

DHK/UDRI

TEST PLAN I.D.No	AIRCRAFT USE	MILITARY MATERIAL DESIGNATION	TYPE MATERIAL	16	0/180 °	F	20	0/225 °	F	250) / 275	° F		325 ° F			400 ° F	
				JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4
I.O.1	Float	Buna-N	Unicellular Buna-N				/W	/W	/W									
I.O.2	Float	Foam	Polyurethane Unicellular				/W	/W	/W									
I.O.3	Float	Foam, Sample #1	Polyurethane				/W	/W	/W									
I.O.4	Float	Foam, Sample #2	Polyurethane				/W	/W	/W									
I.O.5	Float	Foam, Sample #3	Polyurethane				/W	/W	/W									
I.O.6	Float	Foam, Sample #4	Polyurethane				/W	/W	/W									
I.O.7	Float	Foam					/W	/W	/W									
I.O.8	Float	Cork	Cork				W/	W/	W/									

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Tested Beyond Material's Temperature Range
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NT = No Test Planned

JP-8, JP-8 + 100 AND JP 8 + 100 X4 (JP-8 + 100 AND JP-8 + 100 X4 W/BETZ/DEARBORN/8Q462)
TEST DURATION 28 DAYS AT SPECIFIED TEMPERATURES (°F)

DHK/UDRI

			O VERALL TEST EVALUATION RESULTS & TEST STATUS L TYPE															
TEST PLAN I.D.No	AIRCRAFT USE	MILITARY MATERIAL DESIGNATION	TYPE MATERIAL	16	0/180 °	F	:	200 ° F		250) / 275	° F		325 ° F			400 ° F	
				JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4
I.P.1	Potting Compound	Unmodified Epoxy (See I.A.5)	Epoxy				W	w	W									
I.P.2.1	Potting Compound	Polysulfide Film	Polysulfide Film				o	0	o									
I.P.2.2			Electrical Connector Application				O	o	0									
I.P.3	Potting Compound	AMS 3361, Fluorosilicon	Fluorosilicon				NT	NT	NT									
I.P.4	Potting Compound	Urethane	Urethane				NT	NT	NT									

KEY TO SYMBOLS

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Outside Acceptable Requirement
Tested Beyond Material's Temperature Range
Denotes 7 - Day Test Data Available OT =

I = Test Planned (Incomplete) E = Evaluation Incomplete (Tested)

NT = No Test Planned

7 Day Test Results

																	J S	
TEST PLAN I.D. No.	AIRCRAFT USE	MILITARY MATERIAL DESIGNATION	TYPE MATERIAL	16	0/180 °	F		200 ° F		250	7 275	° F		325 ° F	,		400 ° F	
				JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4	JP8	+100	x4
I.B.4	Bladder tank	Innerliner	Nitrile				\mathbf{W}	OT	OT									
I.B.5	Bladder Tank	Innerliner	Polyurethane				ОТ	W	ОТ									
I.C.2	Int. Tank Coating	Coating, MIL-C-17725	Polyurethane				w	W	W									
I.D.2	Int. Tank Sealant	MIL-S-8802	Manganese				o	0	W									
I.E.1	Int. Fuel Tank Composite	AS 4/3501-6	Epoxy Graphite				w	W	W									
I.E.2	Int. Fuel Tank Composite	IM 7/5250-(bmi)	Graphie Bismaliemide				w	W	W									
I.F.3	ESM Foam, Fuel Tank	Foam, Yelloew Type II, MIL-b- 83054	Polyurethane Ester				W	W	W									
I.F.4	ESM Foam, Fuel Tank	Foam, Blue Type IV. MIL-B- 83054	Polyurethane Ether				W	W	W									
I.F.5	ESM Foam, Fuel Gank	MIL-F-87260 Foam ESM Class 1 Gray Charcoal	Polyurethane Ether				W	W	W									
I.G.2	Gasket	"O" Ring MIL-P-25732	Nitrile				ОТ	ОТ	ОТ									
I.G.6	Gasket	"O" Ring MIL-R-83248	Fluorocarbon				W	W	W									
II.G.2	Gasket	"O" Ring MIL-R-25988	Fluorosilicone										ОТ	W	W			
II.G.3	Gasket	"O" Ring MIL-R-83485	Fluorosilicone										О	W	W			
II.G.7	Gasket	"O" Ring MIL-R-25988	Fluorosilicone										ОТ	OT	W			

¹ Tested as a coating (tape adhesion and pencil)

KEY TO SYMBOLS

Within Acceptable Requirement Outside Acceptable Requirement Tested Beyond Material's Temperature Range Denotes 7 - Day Test Data Available

I = Test Planned (Incomplete)
E = Evaluation Incomplete (Tested)
NT = No Test Planned

IX. TEST RESULT DATA SHEETS (28 Days / 7 Days)

TEST PLAN I.D. NO. I.A.1 **MATERIAL / IDENTITY:** ADHESIVE, EPOXY POLYAMIDE TEST TEMPERATURE (°F) AIRFRAME, FUEL TANKS, INTEGRAL 200 USE: BETZ DEARBORN 8Q462 (Normal & x4 Concentrations)/93 POSF 2980 **EXPOSURE TIME (DAYS)** 28 TEST ADDITIVE/FUEL: TEST DATE START: 21 APR 95 JP-8 BASELINE FUEL: 93 POSF 2980 +(JP-8 Additives)

	TEST MA	TERIAL / FUEL	EXPOSURE	TES	T EVALU	ATION CR	ITERIA			EVALUAT	ION OF TH	EST RES	ULTS	
MATERIAL		RESULTS		CONTROL MAT	A	LLOWABLE	E TOLERAN	CE	COMPA	RISON TO CO	ONTROL &	(OVERALI	,
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUII	REMENT		ALLOW	ABLE REQUI	REMENTS	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100 x4	JP8	+100	X4
TENSILE (PSI)														
ELONGATION (%)														
VOLUME SWELL (%)														
HARD'S; a) SHORE A (PTS)														
b) PENCIL														
COMP. SET (avg. 2 spcm's)														
LAP SHEAR (PSI)	4628	4591	4635	4590	30%				+1	+.02	+1	W	W	W
COHESION (%)	100	100	100	100		100%			P	P	P	W	W	W
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														

	TEST FUE	L / MATERIAL	EXPOSURE			CONT	ROL FUEL							
FUELS	4 X 7 DA	X 7 DAY PERIODS (28 DAYS) -8 JP-8 +100 JP8+100 (X4)			PRE (NEV	W) VS. POST	(STRESSED)	200°F 7 DAYS		SPECIFICAT	TON RANGE	(GENERAL	,
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	P-8	JP-8	3 + 100	JP-8 +	100 x4	FOR	JP-8	OBS	ERVATIO	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	C	C1	С	C1	C	C1			NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.002	.001	.002	.003	.003		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	2	4.8	4.4	2.8	9.6	8.6		7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.004	.037	0	.038	0	.018			NE	NE	NE
CONDUCTIVITY pS/m @72°F	447	597	876	108	39	248	131	912	410	150	600	W	W	0
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail DATE: 23 MAR 98

W = Within Allowable Requirement: O = Outside Allowable Requirement UDBLITECH: LDUES

W = Within Allowable Requirement; O = Outside Allowable Requirement UDRI TECH: J.DUES
OT = Material Tested Beyond Temperature Range UDRI ENG: B.WILT

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

A.F. AUT. W./MLSE:

A.F. AUT. W./POSF

S. A. ANDERSON

TEST PLAN I.D. NO. I.A.2 **MATERIAL / IDENTITY:** ADHESIVE, PHENOLIC AIRFRAME, FUEL TANKS, INTEGRAL TEST TEMPERATURE (°F) 200 USE: 28 BETZ DEARBORN 8Q462 (Normal & x4 Concentrations)/93POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: TEST DATE START: 21 APR 95 JP-8 BASELINE FUEL: 93 POSF 2980 +(JP-8 Additives)

	TEST MA	TERIAL / FUEL 1	EXPOSURE	TES	T EVALU	ATION CR	ITERIA			EVALUAT	ION OF T	EST RES	ULTS	
MATERIAL		RESULTS		CONTROL MAT	A	LLOWABLE	E TOLERAN	ICE	COMPAI	RISON TO CO	ONTROL &	(OVERALI	
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUII	REMENT		ALLOW	ABLE REQUI	REMENTS	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100 x4	JP8	+100	X4
TENSILE (PSI)														
ELONGATION (%)														
VOLUME SWELL (%)														
HARD'S; a) SHORE A (PTS)														
b) PENCIL														
COMP. SET (avg. 2 spcm's)														
LAP SHEAR (PSI)	2932	2982	3188	3755	30%				-22	-21	-15	W	W	W
COHESION (%)	100	100	100	100		100%			P	P	P	W	W	W
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														

	TEST FUE	L / MATERIAL	EXPOSURE			CONT	ROL FUEL							
FUELS	4 X 7 DA	Y PERIODS (2	28 DAYS)		PRE (NEV	W) VS. POST	(STRESSED)	200°F 7 DAYS		SPECIFICAT	TON RANGE	(GENERAL	,
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	JP-8 PRE POST		3 + 100	JP-8 +	100 x4	FOR	JP-8	OBS	ERVATIO	ONS
	POST	POST	POST	PRE	PRE POST		POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	C	C1	С	C1	C	C1			NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.002	.001	.002	.003	.003		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	2	4.8	4.4	2.8	9.6	8.6		7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.004	.037	0	.038	0	.018			NE	NE	NE
CONDUCTIVITY pS/m @72°F	448	602	865	108	39	248	131	912	410	150	600	W	W	0
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail DATE:
W = Within Allowable Requirement; O = Outside Allowable Requirement UDRI TECH:

W = Within Allowable Requirement; O = Outside Allowable Requirement UDRI TECH: J. DUES
OT = Material Tested Beyond Temperature Range
N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration
UDRI P.I. ENG: D.H. KALT

24 MAR 98

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

A.F. AUT. WL/POSF S.A. ANDERSON

TEST EVALUATION CDITEDIA

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TEST PLAN I.D. NO. **I.A.3 MATERIAL / IDENTITY:** ADHESIVE, NITRILE, MOD. EPOXY AIRFRAME, FUEL TANK INTEGRAL TEST TEMPERATURE (°F) 160 USE: 28 **TEST ADDITIVE/FUEL:** Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** 11 MAY 95 93 POSF 2980 **TEST DATE START:** JP-8 BASELINE FUEL: + (JP-8 Additives)

	IESI MAI	ERIAL / FUEL	EAPOSURE		TEST	'EVALUA'	TION CRIT	ERIA		EVAI	LUATIO	N OF TE	ST R	ESULT	rs
MATERIAL		RESULTS		CONTRO	OL MAT	AI	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	ONTROL &	(OVERALI	<u></u>
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIR	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)															
ELONGATION (%)															
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)	5573	5503	5463	52	33	30%				+6%	+5%	+4%	\mathbf{W}	W	\mathbf{W}
COHESION (%)	100	100	100	10)0		100%			P	P	P	\mathbf{W}	W	W
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	W) VS. POST (STRESSED) °I	F 7 DAYS		SPECI	FICATION	RANGE		GENERAI	
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JP	P-8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-8		OBS	SERVATIO	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	NE	NE	NE	NE	NE	NE				NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	NE	NE	NE	NE	NE	NE			0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	NE	NE	NE	NE	NE	NE			7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	NE	NE	NE	NE	NE	NE				NE	NE	NE

NOTES:

CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

NE

Not Evaluated: ND = Not Detected: **Designations:** NE =BD = Below Detection: P = Pass: F = Fail

NE

W =Within Allowable Requirement; O = Outside Allowable Requirement

NE

OT =**Material Tested Beyond Temperature Range**

NSR = No Spec. Req. and/or 4 (x) Additive Concentration N/A =Not applicable;

UDRI P.I. ENG: D.H. KALT * Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: A. FLETCHER Between Material Degradation and Fuel Properties Degradation A.F. AUT. WL/POSF S. A. ANDERSON

NE

NE

TEST MATERIAL / FUEL EXPOSURE

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

NE

NE

NE

NE

DATE:

UDRI TECH:

UDRI ENG:

150

600

24 MAR 98

J. DUES

B. WILT

NE

NE

NE

TEST PLAN I.D. NO. I.A.3 **MATERIAL / IDENTITY:** ADHESIVE, NITRILE, MOD. EPOXY TEST TEMPERATURE (°F) AIRFRAME, FUEL TANKS, INTEGRAL 200 USE: BETZ DEARBORN 8Q462 (Normal & x4 Concentrations)/93POSF 2980 **EXPOSURE TIME (DAYS)** 28 TEST ADDITIVE/FUEL: TEST DATE START: 21 APR 95 JP-8 BASELINE FUEL: 93 POSF 2980 +(JP-8 Additives)

	TEST MA	TERIAL / FUEL	EXPOSURE	TES	T EVALU	ATION CR	ITERIA			EVALUAT	ION OF TH	EST RES	ULTS	
MATERIAL		RESULTS		CONTROL MAT	A	LLOWABLE	E TOLERAN	CE	COMPA	RISON TO CO	ONTROL &	(OVERALI	
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUII	REMENT		ALLOW	ABLE REQUI	REMENTS	EV	ALUATI()N
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100 x4	JP8	+100	X4
TENSILE (PSI)														
ELONGATION (%)														
VOLUME SWELL (%)														
HARD'S; a) SHORE A (PTS)														
b) PENCIL														
COMP. SET (avg. 2 spcm's)														
LAP SHEAR (PSI)	5072	5036	5145	4613	30%				+10	+9	+12	W	\mathbf{W}	W
COHESION (%)	66	88	78	70		100%			F	F	F	OT	OT	OT
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)													•	
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														

	-	L / MATERIAL					ROL FUEL							
FUELS	4 X 7 DA	Y PERIODS (2	28 DAYS)		PRE (NEV	V) VS. POST	(STRESSED)	200°F 7 DAYS		SPECIFICAT	TON RANGE	(GENERAL	ı
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	J	JP-8 PRE POST		3 + 100	JP-8 +	100 x4	FOR	JP-8	OBS	ERVATIO	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	C	C1	C	C1	C	C1			NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.002	.001	.002	.003	.003		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	2	4.8	4.4	2.8	9.6	8.6		7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.004	.037	0	.038	0	.018			NE	NE	NE
CONDUCTIVITY pS/m @72°F	446	597	873	108	39	248	131	912	410	150	600	W	W	0
VISUAL OBSERVATIONS														·

NOTES:

Fuel Color: $\mathbf{C} =$ C1 - C6 = Light to Dark Clear

Designations: NE =Not Evaluated; ND = Not Detected; DATE: BD = Below Detection; P = Pass; F = Fail23 MAR 98

W =Within Allowable Requirement; O = Outside Allowable Requirement **UDRI TECH:** J. DUES **Material Tested Beyond Temperature Range** OT = UDRI ENG: B. WILT N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive ConcentrationUDRI P.I. ENG: D.H. KALT

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE:

A. FLETCHER Between Material Degradation and Fuel Properties Degradation A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. I.A.4 / I.P.1 **MATERIAL / IDENTITY:** ADHESIVE, MOD. HI TEMP EPOXY AIRFRAME, FUEL TANKS, INTEGRAL TEST TEMPERATURE (°F) 200 USE: BETZ DEARBORN 8Q462 (Normal & x4 Concentrations)/93POSF 2980 **EXPOSURE TIME (DAYS)** 28 TEST ADDITIVE/FUEL: TEST DATE START: 21 APR 95 JP-8 BASELINE FUEL: 93 POSF 2980 +(JP-8 Additives)

	TEST MA	TERIAL / FUEL 1	EXPOSURE	TES	T EVALU	ATION CR	ITERIA			EVALUAT	TON OF TH	EST RES	ULTS	
MATERIAL		RESULTS		CONTROL MAT	A	LLOWABLE	TOLERAN	CE	COMPA	RISON TO CO	ONTROL &	(VERALI	,
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUIF	REMENT		ALLOW	ABLE REQUI	REMENTS	EV	ALUATIO	DΝ
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100 x4	JP8	+100	X4
TENSILE (PSI)														
ELONGATION (%)														
VOLUME SWELL (%)														
HARD'S; a) SHORE A (PTS)														
b) PENCIL														
COMP. SET (avg. 2 spcm's)														
LAP SHEAR (PSI)	2949	2880	3208	3195	30%				-8	-10	+.4	W	W	W
COHESION (%)	100	100	100	100		100%			P	P	P	W	W	W
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														·
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														

	TEST FUE	L / MATERIAL	EXPOSURE			CONT	ROL FUEL							
FUELS	4 X 7 DA	Y PERIODS (2	28 DAYS)		PRE (NEV	W) VS. POST	(STRESSED)	200°F 7 DAYS		SPECIFICAT	TON RANGE	(SENERAL	1
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	JP-8 PRE POST		3 + 100	JP-8 +	100 x4	FOR	JP-8	OBS	ERVATIO	ONS
	POST	POST	POST	PRE	PRE POST		POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	C	C1	С	C1	C	C1			NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.002	.001	.002	.003	.003		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	2	4.8	4.4	2.8	9.6	8.6		7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.004	.037	0	.038	0	.018			NE	NE	NE
CONDUCTIVITY pS/m @72°F	454	692	861	108	39	248	131	912	410	150	600	W	0	0
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail DATE:
W = Within Allowable Requirement; O = Outside Allowable Requirement UDRI TECH:

W = Within Allowable Requirement; O = Outside Allowable Requirement UDRI TECH: J. DUES
OT = Material Tested Beyond Temperature Range
N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration
UDRI P.I. ENG: D.H. KALT

23 MAR 98

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

A.F. AUT. WL/POSF S.A. ANDERSON

TEST PLAN I.D. NO. I.A.5 **MATERIAL / IDENTITY:** ADHESIVE, EPON UN. MOD. EPOXY TEST TEMPERATURE (°F) 200 USE: AIRFRAME, FUEL TANKS, INTEGRAL **EXPOSURE TIME (DAYS)** 28 TEST ADDITIVE/FUEL: BETZ DEARBORN 8Q462 (Normal & x4 Concentrations)/93POSF 2980 TEST DATE START: 21 APR 95 JP-8 BASELINE FUEL: 93 POSF 2980 +(JP-8 Additives)

	TEST MA	TERIAL / FUEL	EXPOSURE	TES	T EVALU	ATION CR	ITERIA			EVALUAT	ION OF TH	EST RES	ULTS	
MATERIAL		RESULTS		CONTROL MAT	A	LLOWABLE	E TOLERAN	CE	COMPA	RISON TO CO	ONTROL &	(OVERALI	,
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUII	REMENT		ALLOW	ABLE REQUI	REMENTS	EV	ALUATI()N
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100 x4	JP8	+100	X4
TENSILE (PSI)														
ELONGATION (%)														
VOLUME SWELL (%)														
HARD'S; a) SHORE A (PTS)														
b) PENCIL														1
COMP. SET (avg. 2 spcm's)														
LAP SHEAR (PSI)	3659	3884	3851	4294	30%				-15	-9.5	-10	W	W	W
COHESION (%)	100	100	100	100		100%			P	P	P	W	W	W
TAPE ADHESION (P/F)														1
PEEL STRENGTH (LB/IN)														1
LAMINAR SHEAR (PSI)														1
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														1
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														

	TEST FUE	L / MATERIAL	EXPOSURE			CONT	ROL FUEL							
FUELS	4 X 7 DA	Y PERIODS (2	28 DAYS)		PRE (NEV	V) VS. POST	(STRESSED)	200°F 7 DAYS		SPECIFICAT	TON RANGE	(SENERAL	ı
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	JP-8 PRE POST		3 + 100	JP-8 +	100 x4	FOR	JP-8	OBS	ERVATIO	ONS
	POST	POST	POST	PRE	PRE POST		POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	C	C1	С	C1	C	C1			NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.002	.001	.002	.003	.003		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	2	4.8	4.4	2.8	9.6	8.6		7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.004	.037	0	.038	0	.018			NE	NE	NE
CONDUCTIVITY pS/m @72°F	447	588	861	108	39	248	131	912	410	150	600	W	W	0
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: $\mathbf{C} =$ C1 - C6 = Light to Dark Clear

Designations: NE =Not Evaluated; ND = Not Detected; DATE: BD = Below Detection; P = Pass; F = Fail

23 MAR 98 W =Within Allowable Requirement; O = Outside Allowable Requirement **UDRI TECH:** J. DUES **Material Tested Beyond Temperature Range** OT = UDRI ENG: B. WILT

N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive ConcentrationUDRI P.I. ENG:

D.H. KALT * Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: A. FLETCHER Between Material Degradation and Fuel Properties Degradation A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. I.A.6 **MATERIAL / IDENTITY:** ADHESIVE, PRIMER, NITRILE MOD. EPOXY AIRFRAME, FUEL TANKS, INTEGRAL TEST TEMPERATURE (°F) 200 USE: **EXPOSURE TIME (DAYS)** 28 TEST ADDITIVE/FUEL: BETZ DEARBORN 8Q462 (Normal & x4 Concentrations)/93POSF 2980 TEST DATE START: 21 APR 95 JP-8 BASELINE FUEL: 93 POSF 2980 +(JP-8 Additives)

	TEST MA	TERIAL / FUEL	EXPOSURE	TES	T EVALU	ATION CR	ITERIA			EVALUAT	ION OF TI	EST RES	ULTS	
MATERIAL		RESULTS		CONTROL MAT	A	LLOWABLE	E TOLERAN	ICE	COMPAI	RISON TO CO	ONTROL &	(OVERALI	_
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUI	REMENT		ALLOW	ABLE REQUI	REMENTS	EV	ALUATIO)N
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100 x4	JP8	+100	X4
TENSILE (PSI)														
ELONGATION (%)														
VOLUME SWELL (%)														
HARD'S; a) SHORE A (PTS)														
b) PENCIL														
COMP. SET (avg. 2 spcm's)														
LAP SHEAR (PSI)	5083	4765	4762	5010	30%				+2	-5	-5	W	W	W
COHESION (%)	100	100	100	100		100%			P	P	P	W	W	W
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														

										Ì				
	TEST FUE	L / MATERIAL	EXPOSURE			CONT	ROL FUEL							
FUELS	4 X 7 DA	Y PERIODS (2	28 DAYS)		PRE (NEV	W) VS. POST	(STRESSED)	200°F 7 DAYS		SPECIFICAT	TION RANGE	(GENERAL	,
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	Jl			+ 100	JP-8 +	100 x4	FOR	JP-8	OBS	ERVATIO	ONS
	POST	POST	POST	PRE	V- V		POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	C	C1	C	C1	C	C1			NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.002	.001	.002	.003	.003		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	2	4.8	4.4	2.8	9.6	8.6		7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.004	.037	0	.038	0	.018			NE	NE	NE
CONDUCTIVITY pS/m @72°F	454	669	873	108	39	248	131	912	410	150	600	W	0	0
VISUAL OBSERVATIONS														

23 MAR 98

J. DUES

B. WILT

NOTES:

Fuel Color: $\mathbf{C} =$ C1 - C6 = Light to Dark Clear

NE =Not Evaluated; ND = Not Detected; **Designations:** BD = Below Detection; P = Pass; F = Fail

DATE: W =Within Allowable Requirement; O = Outside Allowable Requirement **UDRI TECH: Material Tested Beyond Temperature Range** OT = UDRI ENG:

N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

UDRI P.I. ENG: D.H. KALT * Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: A. FLETCHER Between Material Degradation and Fuel Properties Degradation A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. I.A.7 **MATERIAL / IDENTITY:** ADHESIVE, PRIMER, SCOTCHWELD TEST TEMPERATURE (°F) 200 USE: AIRFRAME, FUEL TANKS, INTEGRAL 28 BETZ DEARBORN 8Q462 (Normal & x4 Concentrations)/93POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: TEST DATE START: 13 DEC 94 JP-8 BASELINE FUEL: 93 POSF 2980 +(JP-8 Additives)

	TEST MA	TERIAL / FUEL 1	EXPOSURE	TES	T EVALU	ATION CR	ITERIA			EVALUAT	ION OF TH	EST RES	ULTS	
MATERIAL		RESULTS		CONTROL MAT	A	LLOWABLE	E TOLERAN	CE	COMPA	RISON TO CO	ONTROL &	(OVERALI	
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUII	REMENT		ALLOW.	ABLE REQUI	REMENTS	EV	ALUATIO)N
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100 x4	JP8	+100	X4
TENSILE (PSI)														
ELONGATION (%)														
VOLUME SWELL (%)														
HARD'S; a) SHORE A (PTS)														
b) PENCIL														
COMP. SET (avg. 2 spcm's)														
LAP SHEAR (PSI)	2788	2671	2653	3132	30%				-11	-15	-15	W	W	W
COHESION (%)	100	100	100	100		100%			P	P	P	W	W	W
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														ĺ
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														

	TEST FUE	L / MATERIAL	EXPOSURE			CONT	ROL FUEL							
FUELS	4 X 7 DA	AY PERIODS (2	28 DAYS)		PRE (NEV	V) VS. POST	(STRESSED)	200°F 7 DAYS		SPECIFICAT	TION RANGE	(GENERAL	4
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR	JP-8	OBS	ERVATIO	ONS
	POST	POST	POST	PRE	JP-8 POST C C1		POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	С	C1	С	C1	С	C1			NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.002	.001	.002	.003	.003		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	2	4.8	4.4	2.8	9.6	8.6		7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.004	.037	0	.038	0	.018			NE	NE	NE
CONDUCTIVITY pS/m @72°F	NE	NE	NE	108	39	248	131	912	410	150	600	NE	NE	NE
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: $\mathbf{C} =$ C1 - C6 = Light to Dark Clear

Designations: NE =Not Evaluated; ND = Not Detected; DATE: BD = Below Detection; P = Pass; F = Fail

23 MAR 98 W =Within Allowable Requirement; O = Outside Allowable Requirement **UDRI TECH:** J. DUES **Material Tested Beyond Temperature Range** OT = UDRI ENG: B. WILT

N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive ConcentrationUDRI P.I. ENG:

D.H. KALT * Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: A. FLETCHER Between Material Degradation and Fuel Properties Degradation A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. I.A.9 / I.C.1 **MATERIAL / IDENTITY:** ADHESIVE/COATING MIL-S-4383,3M NITRILE (ESM FOAM ADHESIVE) TEST TEMPERATURE (°F) 200 USE: AIRFRAME, FUEL TANKS, ESM (FOAM) BETZ DEARBORN 8Q462 (Normal & x4 Concentrations)/93POSF 2980 **EXPOSURE TIME (DAYS)** 28 TEST ADDITIVE/FUEL: TEST DATE START: 20 JUL 95 JP-8 BASELINE FUEL: 92 POSF 2926 +(JP-8 Additives)

	TEST MA	TERIAL / FUEL	EXPOSURE	TES	T EVALU	ATION CR	ITERIA			EVALUAT	ION OF TH	EST RES	ULTS	
MATERIAL		RESULTS		CONTROL MAT	A	LLOWABLE	E TOLERAN	CE	COMPAI	RISON TO CO	ONTROL &	(OVERALI	ı
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUII	REMENT		ALLOW	ABLE REQUI	REMENTS	EV	ALUATIO	DΝ
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100 x4	JP8	+100	X4
TENSILE (PSI)														
ELONGATION (%)														
VOLUME SWELL (%)														
HARD'S; a) SHORE A (PTS)														
b) PENCIL	4B	4B	6B	2H		3B			P	P	P	W	W	W
COMP. SET (avg. 2 spcm's)														
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)	F	P	P	P		P			F	P	P	0	W	\mathbf{W}
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														·
TORQUE (INCH -LBS.)											-			
RUPTURE PRESS. (IN.HG)														·
VISUAL OBSERVATIONS														

	TEST FUE	L / MATERIAL	EXPOSURE			CONT	ROL FUEL							
FUELS	4 X 7 DA	Y PERIODS (2	28 DAYS)		PRE (NEV	V) VS. POST	(STRESSED)	200°F 7 DAYS		SPECIFICAT	TON RANGE	(GENERAL	1
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	J	JP-8 PRE POST		3 + 100	JP-8 +	100 x4	FOR	JP-8	OBS	ERVATIO	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	C	C1	C	C1	C	C1			NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.002	.001	.002	.003	.003		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	2	4.8	4.4	2.8	9.6	8.6		7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.004	.037	0	.038	0	.018			NE	NE	NE
CONDUCTIVITY pS/m @72°F	NE	NE	NE	108	39	248	131	912	410	150	600	NE	NE	NE
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: $\mathbf{C} =$ C1 - C6 = Light to Dark Clear

Designations: NE =Not Evaluated; ND = Not Detected; DATE: BD = Below Detection; P = Pass; F = FailW =Within Allowable Requirement; O = Outside Allowable Requirement **UDRI TECH:**

J. DUES **Material Tested Beyond Temperature Range** OT = UDRI ENG: B. WILT N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive ConcentrationUDRI P.I. ENG: D.H. KALT

23 MAR 98

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE:

A. FLETCHER Between Material Degradation and Fuel Properties Degradation A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. I.A.10 **MATERIAL / IDENTITY:** ADHESIVE, ACRYLIC TEST TEMPERATURE (°F) 200 USE: AIRFRAME, FUEL TANKS, INTEGRAL 28 **TEST ADDITIVE/FUEL:** Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /92 POSF 2926 **EXPOSURE TIME (DAYS)** 8 OCT 97 92 POSF 2926 **TEST DATE START:** JP-8 BASELINE FUEL: + (JP-8 Additives)

	TEST MAT	TERIAL / FUEL	EXPOSURE		TEST	EVALUA	TION CRIT	ERIA		EVAL	LUATIO	ON OF TE	ST R	ESULT	rs
MATERIAL		RESULTS		CONTR	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPARI	ISON TO C	CONTROL &		OVERAL	
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIR	REMENT		ALLOWA	BLE REQU	IREMENTS	EV	VALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)															
ELONGATION (%)															
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)	1087	919	761	34	68	30%				-69%	-74%	-78%	О	0	О
COHESION (%)	90	78	83	5	5		100%			F	F	F	О	0	0
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	W) VS. POST (STRESSED) °1	F 7 DAYS		SPECI	FICATION	RANGE		GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JF	P-8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-8	3	OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	С	C1	С	C1	С	C1				NE	NE	NE

.001

4.4

0

248

.002

2.6

.038

131

.003

9.6

0

912

.003

8.6

.018

410

NOTES:

ACID NO. mgKOH/gm

HYDROPEROXIDES mM/l

CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

GUMS mg/100ml

Fuel Color: C = Clear C1 - C6 = Light to Dark

NE

NE

NE

NE

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

NE

NE

NE

NE

W = Within Allowable Requirement; O = Outside Allowable Requirement

.001

.6

.001

100

OT = Material Tested Beyond Temperature Range

NE

NE

NE

NE

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation DATE: 23 MAR 98
UDRI TECH: J. DUES
UDRI ENG: B. WILT
UDRI P.I. ENG: D.H. KALT
A.F. AUT. W./MLSE: A. FLETCHER
A.F. AUT. WL/POSF S. A. ANDERSON

150

0.015

7

600

NE

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

.001

.8

.002

66

TEST PLAN I.D. NO. **MATERIAL / IDENTITY:** ADHESIVE, FILLED EPOXY (1:1 MIX) I.A.11.1 TEST TEMPERATURE (°F) 200 USE: AIRFRAME, INTEGRAL FUEL TANK **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /92 POSF 2926 92 POSF 2926 **TEST DATE START:** 1 SEP 97 JP-8 BASELINE FUEL: + (JP-8 Additives)

	TEST MAT	TERIAL / FUEL	EXPOSURE	TEST	EVALUA	FION CRIT	TERIA		EVAI	LUATION	OF TE	ST R	ESULT	rs
MATERIAL		RESULTS		CONTROL MAT	AI	LOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	NTROL &		OVERAL	ւ
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUIR	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)														
ELONGATION (%)														
VOLUME SWELL (%)														
HARD'S; a) SHORE A (PTS)														
b) PENCIL														
COMP. SET (avg. 2 spcm's)														
LAP SHEAR (PSI)	4112	4568	4322	5327	30%				-23%	-14%	-19%	\mathbf{W}	\mathbf{W}	\mathbf{W}
COHESION (%)	100	100	100	100		100%			P	P	P	\mathbf{W}	\mathbf{W}	\mathbf{W}
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														

	TEST FUEI	L / MATERIAL	EXPOSURE			CONTRO	OL FUEL							
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	V) VS. POST (STRESSED) °	F 7 DAYS		SPECIFICAT	TION RANGE		GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JP-8 PRE POST		JP-8	+ 100	JP-8 +	100 x4	FOR	JP-8	OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	C	C1	C	C1	С	C1			NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.001	.001	.002	.003	.003		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	.6	.8	4.4	2.6	9.6	8.6		7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.001	.002	0	.038	0	.018			NE	NE	NE
CONDUCTIVITY pS/m @72°F	NE	NE	NE	100	66	248	131	912	410	150	600	NE	NE	NE
VISUAL OBSERVATIONS														

NOTES: NOTES:

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

W = Within Allowable Requirement; O = Outside Allowable Requirement
OT = Material Tested Beyond Temperature Range

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation DATE: 23 MAR 98
UDRI TECH: J. DUES
UDRI ENG: B. WILT
UDRI P.I. ENG: D.H. KALT
A.F. AUT. W/MLSE: A. FLETCHER
A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. I.A.11.2 **MATERIAL / IDENTITY:** ADHESIVE, FILLED EPOXY (2:1 MIX) TEST TEMPERATURE (°F) 200 AIRFRAME, INTEGRAL FUEL TANK USE: **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz/Dearborn 8O462 ((Normal and x4 Concentrations) /92 POSF 2926 92 POSF 2926 **TEST DATE START:** 3 SEP 97 JP-8 BASELINE FUEL: + (JP-8 Additives)

	TEST MAT	TERIAL / FUEL	EXPOSURE	TEST	EVALUA'	TION CRIT	ERIA		EVAI	LUATIO	N OF TE	ST R	ESUL?	ΓS
MATERIAL		RESULTS		CONTROL MAT	A.	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	NTROL &		OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUIR	REMENT		ALLOWA	BLE REQUII	REMENTS	EV	VALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)														
ELONGATION (%)														
VOLUME SWELL (%)														
HARD'S; a) SHORE A (PTS)														
b) PENCIL														
COMP. SET (avg. 2 spcm's)														
LAP SHEAR (PSI)	4552	4478	4434	4899	30%				-7 %	-9%	-9%	\mathbf{W}	\mathbf{W}	W
COHESION (%)	100	100	100	100		100%			P	P	P	\mathbf{W}	\mathbf{W}	W
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)													<u> </u>	
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS													<u> </u>	

	TEST FUEI	L / MATERIAL	EXPOSURE			CONTR	OL FUEL							
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	V) VS. POST (STRESSED) °1	F 7 DAYS		SPECIFICAT	TION RANGE		GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JP-8 PRE POST		JP-8	+ 100	JP-8 +	100 x4	FOR	JP-8	OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	C	C1	C	C1	С	C1			NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.001	.001	.002	.003	.003		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	.6	.8	4.4	2.6	9.6	8.6		7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.001	.002	0	.038	0	.018			NE	NE	NE
CONDUCTIVITY pS/m @72°F	NE	NE	NE	100	66	248	131	912	410	150	600	NE	NE	NE
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations:

NE =Not Evaluated; ND = Not Detected; W =Within Allowable Requirement;

BD = Below Detection; P = Pass; F = FailO = Outside Allowable Requirement **Material Tested Beyond Temperature Range**

DATE: 23 MAR 98 UDRI TECH: J. DUES UDRI ENG: B. WILT UDRI P.I. ENG: D.H. KALT

A.F. AUT. WL/POSF S. A. ANDERSON

A. FLETCHER

A.F. AUT. W./MLSE:

Not applicable: N/A =

OT =

NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. **I.B.1 MATERIAL / IDENTITY: BLADDER TANK, NITRILE** TEST TEMPERATURE (°F) AIRFRAME, FUEL TANK BLADDER INNERLINER 200 USE: BETZ DEARBORN 8Q462 (Normal & x4 Concentrations)/93POSF 2980 **EXPOSURE TIME (DAYS)** 28 TEST ADDITIVE/FUEL: TEST DATE START: 30 NOV 94 JP-8 BASELINE FUEL: 93 POSF 2980 +(JP-8 Additives)

	TEST MA	TERIAL / FUEL 1	EXPOSURE	TES	T EVALU	ATION CR	ITERIA			EVALUAT	ION OF T	EST RES	ULTS	
MATERIAL		RESULTS		CONTROL MAT	A	LLOWABLE	E TOLERAN	ICE	COMPA	RISON TO CO	ONTROL &	(OVERALL	,
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUII	REMENT		ALLOW	ABLE REQUI	REMENTS	EV	ALUATIO)N
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100 x4	JP8	+100	X4
TENSILE (PSI)	7791	8920	8793	7000	20%				+11%	+27%	+26%	W	W	W
ELONGATION (%)	26	30	28	46	35%				-43%	-35%	-39%	OT	W	W
VOLUME SWELL (%)	4	4	5	N/A				12%	P	P	P	W	W	W
HARD'S; a) SHORE A (PTS)														1
b) PENCIL														1
COMP. SET (avg. 2 spcm's)														1
LAP SHEAR (PSI)														
COHESION (%)														1
TAPE ADHESION (P/F)														1
PEEL STRENGTH (LB/IN)														1
LAMINAR SHEAR (PSI)														1
RESISTIVITY (OHM-CM)														1
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														

	TEST FUE	L / MATERIAL	EXPOSURE			CONT	ROL FUEL							
FUELS	4 X 7 DA	Y PERIODS (2	28 DAYS)		PRE (NEV	V) VS. POST	(STRESSED)	200°F 7 DAYS		SPECIFICAT	TON RANGE	(GENERAL	,
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	JP-8 PRE POST		3 + 100	JP-8 +	100 x4	FOR	JP-8	OBS	ERVATIO	ONS
	POST	POST	POST	PRE	PRE POST		POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	C1	C1	C1	C	C1	C	C1	C	C1			W	W	W
ACID NO. mgKOH/gm	.001	.001	.003	.001	.002	.001	.002	.003	.003		0.015	W	W	W
GUMS mg/100ml	2	4.6	12	2	4.8	4.4	2.8	9.6	8.6		7	W	W	NSR
HYDROPEROXIDES mM/l	.01	.003	NE	.004	.037	0	.038	0	.018			NSR	NSR	NSR
CONDUCTIVITY pS/m @72°F	41	284	447	108	39	248	131	912	410	150	600	0	W	NSR
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: $\mathbf{C} =$ C1 - C6 = Light to Dark Clear

Designations: NE =Not Evaluated; ND = Not Detected; DATE: BD = Below Detection; P = Pass; F = Fail23 MAR 98 W =Within Allowable Requirement; **UDRI TECH:**

O = Outside Allowable Requirement J. DUES **Material Tested Beyond Temperature Range** OT = UDRI ENG: B. WILT N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive ConcentrationUDRI P.I. ENG: D.H. KALT

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE:

A. FLETCHER Between Material Degradation and Fuel Properties Degradation A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. **I.B.2 MATERIAL / IDENTITY: BLADDER TANK, NITRILE** TEST TEMPERATURE (°F) AIRFRAME, FUEL TANK BLADDER INNERLINER 200 USE: 28 BETZ DEARBORN 8Q462 (Normal & x4 Concentrations)/93POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: TEST DATE START: 29 NOV 94 JP-8 BASELINE FUEL: 93 POSF 2980 +(JP-8 Additives)

	TEST MA	TERIAL / FUEL 1	EXPOSURE	TES	T EVALU	ATION CR	ITERIA			EVALUAT	ION OF TH	EST RES	ULTS	
MATERIAL		RESULTS		CONTROL MAT	A	LLOWABLE	E TOLERAN	ICE	COMPA	RISON TO CO	ONTROL &	(OVERALI	,
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUII	REMENT		ALLOW	ABLE REQUI	REMENTS	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100 x4	JP8	+100	X4
TENSILE (PSI)	6768	7407	7464	11,750	20%				-42%	-37%	-37%	OT	W	W
ELONGATION (%)	25	25	23	32	35%				-22%	-22%	-28%	W	W	W
VOLUME SWELL (%)	-3	-5	-6	N/A				12%	P	P	P	W	W	W
HARD'S; a) SHORE A (PTS)														
b) PENCIL														
COMP. SET (avg. 2 spcm's)														
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														

	TEST FUE	L / MATERIAL	EXPOSURE			CONT	ROL FUEL	ı						
FUELS	4 X 7 DA	AY PERIODS (2	28 DAYS)		PRE (NEV	V) VS. POST	(STRESSED)	200°F 7 DAYS		SPECIFICAT	TON RANGE	(GENERAI	,
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	J	PRE POST		3 + 100	JP-8 +	100 x4	FOR	JP-8	OBS	SERVATIO	ONS
	POST	POST	POST	PRE			POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	C1	C1	C1	С	C1	С	C1	С	C1			W	W	W
ACID NO. mgKOH/gm	.002	.003	.003	.001	.002	.001	.002	.003	.003		0.015	W	W	W
GUMS mg/100ml	3	5.4	13	2	4.8	4.4	2.8	9.6	8.6		7	W	W	NSR
HYDROPEROXIDES mM/l	.018	.006	.003	.004	.037	0	.038	0	.018			NSR	NSR	NSR
CONDUCTIVITY pS/m @72°F	29	316	450	108	39	248	131	912	410	150	600	0	W	NSR
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: $\mathbf{C} =$ C1 - C6 = Light to Dark Clear

Designations: NE =Not Evaluated; ND = Not Detected; DATE: BD = Below Detection; P = Pass; F = FailW =Within Allowable Requirement; **UDRI TECH:**

O = Outside Allowable Requirement J. DUES **Material Tested Beyond Temperature Range** OT = UDRI ENG: B. WILT N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive ConcentrationUDRI P.I. ENG: D.H. KALT

23 MAR 98

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE:

A. FLETCHER Between Material Degradation and Fuel Properties Degradation A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. **I.B.3 MATERIAL / IDENTITY:** BLADDER TANK, POLYURETHANE TEST TEMPERATURE (°F) AIRFRAME, FUEL TANK BLADDER INNERLINER 200 USE: BETZ DEARBORN 8Q462 (Normal & x4 Concentrations) 93/POSF 2980 **EXPOSURE TIME (DAYS)** 28 TEST ADDITIVE/FUEL: TEST DATE START: 23 NOV 94 JP-8 BASELINE FUEL: 93 POSF 2980 +(JP-8 Additives)

	TEST MA	TERIAL / FUEL 1	EXPOSURE	TES	T EVALU	ATION CR	ITERIA			EVALUAT	ION OF TH	EST RES	ULTS	
MATERIAL		RESULTS		CONTROL MAT	A	LLOWABLE	E TOLERAN	ICE	COMPA	RISON TO CO	ONTROL &	(OVERALL	,
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUII	REMENT		ALLOW	ABLE REQUI	REMENTS	EV	ALUATIO	DΝ
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100 x4	JP8	+100	X4
TENSILE (PSI)	1512	1693	1765	1162	20%				+30	+46	+52	W	W	W
ELONGATION (%)	225	211	201	72	35%				+213	+193	+179	W	W	W
VOLUME SWELL (%)	8.4	8.4	10	N/A				12%	P	P	P	W	W	W
HARD'S; a) SHORE A (PTS)														
b) PENCIL														
COMP. SET (avg. 2 spcm's)														
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														

	TEST FUE	L / MATERIAL	EXPOSURE			CONT	ROL FUEL	1						
FUELS	4 X 7 DA	AY PERIODS (2	28 DAYS)		PRE (NEV	V) VS. POST	(STRESSED)	200°F 7 DAYS		SPECIFICAT	TON RANGE	(GENERAL	
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	J	JP-8 PRE POST		+ 100	JP-8 +	100 x4	FOR	JP-8	OBS	ERVATIO	ONS
	POST	POST	POST	PRE	V- V		POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	C1	C1	C1	С	C1	С	C1	С	C1			W	W	W
ACID NO. mgKOH/gm	.001	.001	.002	.001	.002	.001	.002	.003	.003		0.015	W	W	W
GUMS mg/100ml	11.6	15.2	22.8	2	4.8	4.4	2.8	9.6	8.6		7	0	0	NSR
HYDROPEROXIDES mM/l	.011	.004	.004	.004	.037	0	.038	0	.018			W	W	W
CONDUCTIVITY pS/m @72°F	13	127	371	108	39	248	131	912	410	150	600	0	0	NSR
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail DATE:

W = Within Allowable Requirement: O = Outside Allowable Requirement UDBLITECH:

W = Within Allowable Requirement; O = Outside Allowable Requirement UDRI TECH: J. DUES
OT = Material Tested Beyond Temperature Range UDRI ENG: B. WILT

23 MAR 98

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration UDRI P.I. ENG: <u>D.H. KALT</u>
* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

A.F. AUT. W./MLSE: A. FLETCHE

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

A.F. AUT. W./MLSE:

A.F. AUT. W./POSF

S. A. ANDERSON

TEST PLAN I.D. NO. **I.B.4 MATERIAL / IDENTITY: BLADDER TANK, NITRILE** TEST TEMPERATURE (°F) 160 USE: AIRFRAME, FUEL TANK BLADDER INNERLINER BETZ DEARBORN 8Q462 (Normal & x4 Concentrations) 93/POSF 2980 **EXPOSURE TIME (DAYS)** 28 TEST ADDITIVE/FUEL: TEST DATE START: 23 JUL 96 JP-8 BASELINE FUEL: 92 POSF 2926 +(JP-8 Additives)

	TEST MA	TERIAL / FUEL 1	EXPOSURE	TES	T EVALU	ATION CR	ITERIA			EVALUAT	ION OF T	EST RES	ULTS	
MATERIAL		RESULTS		CONTROL MAT	A	LLOWABLE	E TOLERAN	ICE	COMPA	RISON TO CO	ONTROL &	(OVERALI	
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUII	REMENT		ALLOW	ABLE REQUI	REMENTS	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100 x4	JP8	+100	X4
TENSILE (PSI)	2128	2225	2128	2441	50%				-13	-9	-13	W	W	W
ELONGATION (%)	398	389	399	568	35%				-30	-32	-30	W	W	W
VOLUME SWELL (%)	-3	-1	-3	N/A				12%	P	P	P	W	W	W
HARD'S; a) SHORE A (PTS)														
b) PENCIL														
COMP. SET (avg. 2 spcm's)														
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														

	TEST FUE	L / MATERIAL	EXPOSURE			CONT	ROL FUEL							
FUELS	4 X 7 DA	AY PERIODS (2	28 DAYS)		PRE (NEV	V) VS. POST	(STRESSED)	160°F 7 DAYS		SPECIFICAT	TON RANGE	(GENERAL	
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	J]	JP-8 PRE POST		3 + 100	JP-8 +	100 x4	FOR	JP-8	OBS	ERVATIO	ONS
	POST	POST	POST	PRE			POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	C	C1	С	C1	C	C1			NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	NE	.001	.002	.003	.003		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	.6	NE	4.4	5.2	9.6	12.4		7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.001	NE	0	.001	0	ND			NE	NE	NE
CONDUCTIVITY pS/m @72°F	161	457	663	100	NE	248	NE	912	NE	150	600	W	W	NSR
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: $\mathbf{C} =$ C1 - C6 = Light to Dark Clear

Designations: NE =Not Evaluated; ND = Not Detected; DATE: BD = Below Detection; P = Pass; F = Fail

23 MAR 98 W =Within Allowable Requirement; O = Outside Allowable Requirement **UDRI TECH:** J. DUES **Material Tested Beyond Temperature Range** OT = UDRI ENG: B. WILT

N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive ConcentrationUDRI P.I. ENG: D.H. KALT

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: A. FLETCHER Between Material Degradation and Fuel Properties Degradation A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. **I.B.4 MATERIAL / IDENTITY: BLADDER TANK, NITRILE** TEST TEMPERATURE (°F) AIRFRAME, FUEL TANK BLADDER INNERLINER 200 USE: BETZ DEARBORN 8Q462 (Normal & x4 Concentrations) 93/POSF 2980 **EXPOSURE TIME (DAYS)** 28 TEST ADDITIVE/FUEL: TEST DATE START: 9 JUN 94 JP-8 BASELINE FUEL: 93 POSF 2980 +(JP-8 Additives)

	TEST MA	TERIAL / FUEL I	EXPOSURE	TES	T EVALU	ATION CR	ITERIA			EVALUAT	ION OF TH	EST RES	ULTS	
MATERIAL		RESULTS		CONTROL MAT	A	LLOWABLE	E TOLERAN	CE	COMPA	RISON TO CO	ONTROL &	(OVERALI	,
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUII	REMENT		ALLOW	ABLE REQUI	REMENTS	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100 x4	JP8	+100	X4
TENSILE (PSI)	1647	1799	1887	2441	50%				-33	-26	-23	W	W	W
ELONGATION (%)	113	94	111	568	35%				-80	-83	-80	OT	OT	OT
VOLUME SWELL (%)	-4	-5	-5	N/A				12%	P	P	P	W	W	W
HARD'S; a) SHORE A (PTS)														
b) PENCIL														
COMP. SET (avg. 2 spcm's)														
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														

	-	L / MATERIAL					ROL FUEL							
FUELS	4 X 7 DA	Y PERIODS (2	28 DAYS)		PRE (NEV	V) VS. POST	(STRESSED) 2	200°F 7 DAYS		SPECIFICAT	TON RANGE	(GENERAL	
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	J	PRE POST		+ 100	JP-8 +	100 x4	FOR	JP-8	OBS	ERVATIO	ONS
	POST	POST	POST	PRE	<u> </u>		POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	C	C1	C	C1	C	C1			NE	NE	NSR
ACID NO. mgKOH/gm	NE	NE	NE	.001	.002	.001	.002	.003	.003		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	2	4.8	4.4	2.8	9.6	8.6		7	NE	NE	NSR
HYDROPEROXIDES mM/l	NE	NE	NE	.004	.037	0	.038	0	.018			NE	NE	NSR
CONDUCTIVITY pS/m @72°F	187	529	769	103	39	248	131	912	410	150	600	W	W	NSR
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: $\mathbf{C} =$ C1 - C6 = Light to Dark Clear

Designations: NE =Not Evaluated; ND = Not Detected; DATE: BD = Below Detection; P = Pass; F = Fail

W =Within Allowable Requirement; O = Outside Allowable Requirement **UDRI TECH:** J. DUES **Material Tested Beyond Temperature Range** OT = UDRI ENG: B. WILT

23 MAR 98

N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive ConcentrationUDRI P.I. ENG: D.H. KALT * Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: A. FLETCHER

Between Material Degradation and Fuel Properties Degradation A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. I.B.5 **MATERIAL / IDENTITY: BLADDER TANK, POLYURETHANE** TEST TEMPERATURE (°F) AIRFRAME, FUEL TANK BLADDER INNERLINER 160 USE: **EXPOSURE TIME (DAYS)** 28 TEST ADDITIVE/FUEL: BETZ DEARBORN 8Q462 (Normal & x4 Concentrations) 93/POSF 2980 TEST DATE START: 29 MAY 96 JP-8 BASELINE FUEL: 92 POSF 2926 +(JP-8 Additives)

	TEST MA	TERIAL / FUEL 1	EXPOSURE	TES	T EVALU	ATION CR	ITERIA			EVALUAT	ION OF TH	EST RES	ULTS	
MATERIAL		RESULTS		CONTROL MAT	A	LLOWABLE	TOLERAN	CE	COMPA	RISON TO CO	ONTROL &	(OVERALI	,
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUII	REMENT		ALLOW.	ABLE REQUI	REMENTS	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100 x4	JP8	+100	X4
TENSILE (PSI)	2082	2025	1979	3292	50%				-37%	-38%	-40%	W	W	W
ELONGATION (%)	545	512	515	449	35%				+21%	+14%	+15%	W	W	W
VOLUME SWELL (%)	10	23	17	N/A				12%	P	F	F	W	0	О
HARD'S; a) SHORE A (PTS)														
b) PENCIL														
COMP. SET (avg. 2 spcm's)														
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														

	TEST FUE	L / MATERIAL	EXPOSURE			CONT	ROL FUEL							
FUELS	4 X 7 DA	Y PERIODS (2	28 DAYS)		PRE (NEV	V) VS. POST	(STRESSED)	160°F 7 DAYS		SPECIFICAT	TON RANGE	(SENERAL	
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	J]	JP-8 PRE POST		3 + 100	JP-8 +	100 x4	FOR	JP-8	OBS	ERVATIO	ONS
	POST	POST	POST	PRE	V- V		POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	C	C1	C	C1	C	C1			NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	NE	.001	.002	.003	.003		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	.6	NE	4.4	5.2	9.6	12.4		7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.001	NE	0	.001	0	ND			NE	NE	NE
CONDUCTIVITY pS/m @72°F	NE	NE	NE	100	NE	248	NE	912	NE	150	600	NE	NE	NE
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: $\mathbf{C} =$ C1 - C6 = Light to Dark Clear

Designations: NE =Not Evaluated; ND = Not Detected; DATE: BD = Below Detection; P = Pass; F = Fail

W =Within Allowable Requirement; O = Outside Allowable Requirement **UDRI TECH:** J. DUES **Material Tested Beyond Temperature Range** OT = UDRI ENG: B. WILT N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive ConcentrationUDRI P.I. ENG: D.H. KALT

23 MAR 98

A. FLETCHER

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: Between Material Degradation and Fuel Properties Degradation A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. I.B.5 **MATERIAL / IDENTITY: BLADDER TANK, POLYURETHANE** TEST TEMPERATURE (°F) AIRFRAME, FUEL TANK BLADDER INNERLINER 200 USE: BETZ DEARBORN 8Q462 (Normal & x4 Concentrations)/93POSF 2980 **EXPOSURE TIME (DAYS)** 28 TEST ADDITIVE/FUEL: TEST DATE START: 9 JUN 94 JP-8 BASELINE FUEL: 93 POSF 2980 +(JP-8 Additives)

	TEST MA	TERIAL / FUEL 1	EXPOSURE	TES	T EVALU	ATION CR	ITERIA			EVALUAT	ION OF TH	EST RES	ULTS	
MATERIAL		RESULTS		CONTROL MAT	A	LLOWABLE	E TOLERAN	CE	COMPA	RISON TO CO	ONTROL &	(OVERALI	,
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUII	REMENT		ALLOW	ABLE REQUI	REMENTS	EV	ALUATI(ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100 x4	JP8	+100	X4
TENSILE (PSI)	2217	2134	2177	3292	50%				-33%	-35%	-34%	W	W	W
ELONGATION (%)	567	540	529	449	35%				+26%	+20%	+18%	W	W	W
VOLUME SWELL (%)	17	28	29	N/A				12%	F	F	F	OT	OT	OT
HARD'S; a) SHORE A (PTS)														
b) PENCIL														
COMP. SET (avg. 2 spcm's)														
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														

	TEST FUE	L / MATERIAL	EXPOSURE			CONT	ROL FUEL							
FUELS	4 X 7 DA	Y PERIODS (2	28 DAYS)		PRE (NEV	W) VS. POST	(STRESSED)	200°F 7 DAYS		SPECIFICAT	TON RANGE	(GENERAL	,
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	JP-8 PRE POST		3 + 100	JP-8 +	100 x4	FOR	JP-8	OBS	ERVATIO	ONS
	POST	POST	POST	PRE	V- V		POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	C	C1	С	C1	C	C1			NE	NE	NSR
ACID NO. mgKOH/gm	NE	NE	NE	.001	.002	.001	.002	.003	.003		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	2	4.8	4.4	2.8	9.6	8.6		7	NE	NE	NSR
HYDROPEROXIDES mM/l	NE	NE	NE	.004	.037	0	.038	0	.018			NE	NE	NSR
CONDUCTIVITY pS/m @72°F	129	243	532	108	39	248	131	912	410	150	600	0	W	0
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: $\mathbf{C} =$ C1 - C6 = Light to Dark Clear

Designations: NE =Not Evaluated; ND = Not Detected; DATE: BD = Below Detection; P = Pass; F = Fail

W =Within Allowable Requirement; O = Outside Allowable Requirement **UDRI TECH:** J. DUES **Material Tested Beyond Temperature Range** OT = UDRI ENG: B. WILT D.H. KALT

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N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive ConcentrationUDRI P.I. ENG:

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: A. FLETCHER Between Material Degradation and Fuel Properties Degradation A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. I.B.7 **MATERIAL / IDENTITY: BLADDER TANK, NITRILE** TEST TEMPERATURE (°F) AIRFRAME, FUEL TANK BLADDER INNERLINER 200 USE: BETZ DEARBORN 8Q462 (Normal & x4 Concentrations) 93/POSF 2980 **EXPOSURE TIME (DAYS)** 28 TEST ADDITIVE/FUEL: TEST DATE START: 9 FEB 95 JP-8 BASELINE FUEL: 93 POSF 2980 +(JP-8 Additives)

	TEST MA	TERIAL / FUEL	EXPOSURE	TES	T EVALU	ATION CR	ITERIA			EVALUAT	ION OF TH	EST RES	ULTS	
MATERIAL		RESULTS		CONTROL MAT	A	LLOWABLE	E TOLERAN	ICE	COMPA	RISON TO CO	ONTROL &	(OVERALI	,
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUI	REMENT		ALLOW	ABLE REQUI	REMENTS	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100 x4	JP8	+100	X4
TENSILE (PSI)	1674	1609	1652	2416	50%				-31%	-33%	-32%	W	W	W
ELONGATION (%)	124	134	144	459	35%				-73%	-71%	-69%	OT	OT	OT
VOLUME SWELL (%)	5	5	5	N/A				12%	P	P	P	W	W	W
HARD'S; a) SHORE A (PTS)														
b) PENCIL														
COMP. SET (avg. 2 spcm's)														
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														

	TEST FUE	L / MATERIAL	EXPOSURE			CONT	ROL FUEL							
FUELS	4 X 7 DA	Y PERIODS (2	28 DAYS)		PRE (NEV	W) VS. POST	(STRESSED)	200°F 7 DAYS		SPECIFICAT	TON RANGE	(GENERAL	_
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	J]	JP-8 PRE POST		3 + 100	JP-8 +	100 x4	FOR	JP-8	OBS	ERVATIO	ONS
	POST	POST	POST	PRE	V- V		POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	C	C1	С	C1	C	C1			NE	NE	NSR
ACID NO. mgKOH/gm	.001	.003	.003	.001	.002	.001	.002	.003	.003		0.015	W	W	W
GUMS mg/100ml	2.8	5.2	11.4	2	4.8	4.4	2.8	9.6	8.6		7	W	W	NSR
HYDROPEROXIDES mM/l	.015	.012	.011	.004	.037	0	.038	0	.018			О	W	NSR
CONDUCTIVITY pS/m @72°F	466	802	940	108	39	248	131	912	410	150	600	W	0	NSR
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: $\mathbf{C} =$ C1 - C6 = Light to Dark Clear

Designations: NE =Not Evaluated; ND = Not Detected; DATE: BD = Below Detection; P = Pass; F = Fail23 MAR 98

W =Within Allowable Requirement; O = Outside Allowable Requirement **UDRI TECH:** J. DUES **Material Tested Beyond Temperature Range** OT = UDRI ENG: B. WILT N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive ConcentrationUDRI P.I. ENG: D.H. KALT

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE:

A. FLETCHER Between Material Degradation and Fuel Properties Degradation A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. BLADDER TANK, URETHANE **I.B.8** MATERIAL / IDENTITY: TEST TEMPERATURE (°F) 200 USE: AIRFRAME, FUEL TANK BLADDER INNERLINER **EXPOSURE TIME (DAYS)** 28 TEST ADDITIVE/FUEL: BETZ DEARBORN 8Q462 (Normal & x4 Concentrations)/POSF 2980 93 POSF 2980 +(JP-8 Additives) 14 FEB 95 TEST DATE START: JP-8 BASELINE FUEL:

	TEST MA	TERIAL / FUEL 1	EXPOSURE	TES	T EVALU	ATION CR	ITERIA			EVALUAT	TON OF TH	EST RES	ULTS	
MATERIAL		RESULTS		CONTROL MAT	A	LLOWABLE	E TOLERAN	ICE	COMPA	RISON TO CO	ONTROL &	(OVERALL	_
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUII	REMENT		ALLOW	ABLE REQUI	REMENTS	EV	ALUATIO)N
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100 x4	JP8	+100	X4
TENSILE (PSI)	5881	5821	6219	5878	50%				0%	-1%	+6%	W	W	W
ELONGATION (%)	362	362	394	276	35%				+31%	+31%	+43%	W	W	W
VOLUME SWELL (%)	13	12	12	N/A				12%	F	P	P	OT	\mathbf{W}	W
HARD'S; a) SHORE A (PTS)														
b) PENCIL														
COMP. SET (avg. 2 spcm's)														
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS													1	

	TEST FUE	L / MATERIAL	EXPOSURE			CONT	ROL FUEL							
FUELS	4 X 7 DA	Y PERIODS (2	28 DAYS)		PRE (NEV	V) VS. POST	(STRESSED)	200°F 7 DAYS		SPECIFICAT	TION RANGE	(SENERAL	
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	Jl	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR	JP-8	OBS	ERVATIO	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	C	C1	C	C1	C	C1			NE	NE	NSR
ACID NO. mgKOH/gm	NE	.001	.002	.001	.002	.001	.002	.003	.003		0.015	NE	W	W
GUMS mg/100ml	NE	6.4	13.4	2	4.8	4.4	2.8	9.6	8.6		7	NE	W	NSR
HYDROPEROXIDES mM/l	NE	.026	.015	.004	.037	0	.038	0	.018			NE	NSR	NSR
CONDUCTIVITY pS/m @72°F	NE	594	836	108	39	248	131	912	410	150	600	NE	W	NSR
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

W =Within Allowable Requirement; O = Outside Allowable Requirement Material Tested Beyond Temperature Range OT =

B. WILT UDRI ENG: N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration UDRI P.I. ENG: D.H. KALT A.F. AUT. W./MLSE: __A. FLETCHER

DATE:

UDRI TECH:

23 MAR 98

J. DUES

A.F. AUT. WL/POSF S. A. ANDERSON

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. I.B.11 **MATERIAL / IDENTITY: BLADDER TANK, NYLON** TEST TEMPERATURE (°F) AIRFRAME, FUEL TANK BLADDER, STRUCTURAL CLOTH 200 USE: BETZ DEARBORN 8Q462 (Normal & x4 Concentrations) 93/POSF 2980 **EXPOSURE TIME (DAYS)** 28 TEST ADDITIVE/FUEL: TEST DATE START: 21 NOV 95 JP-8 BASELINE FUEL: 92 POSF 2926 +(JP-8 Additives)

	TEST MA	TERIAL / FUEL 1	EXPOSURE	TES	T EVALU	ATION CR	ITERIA			EVALUAT	ION OF TH	EST RES	ULTS	
MATERIAL		RESULTS		CONTROL MAT	A	LLOWABLE	E TOLERAN	ICE	COMPA	RISON TO CO	ONTROL &	(OVERALL	
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUII	REMENT		ALLOW	ABLE REQUI	REMENTS	EV	ALUATIO	N
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100 x4	JP8	+100	X4
TENSILE (PSI)	90	91	94	85	20%				+6%	+7%	+11%	W	W	W
ELONGATION (%)	17	17	19	19	35%				-11%	-11%	0%	W	W	W
VOLUME SWELL (%)														
HARD'S; a) SHORE A (PTS)														
b) PENCIL														
COMP. SET (avg. 2 spcm's)														
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														

	TEST FUE	L / MATERIAL	EXPOSURE			CONT	ROL FUEL							
FUELS	4 X 7 DA	Y PERIODS (2	28 DAYS)		PRE (NEV	W) VS. POST	(STRESSED)	200°F 7 DAYS		SPECIFICAT	TON RANGE	(SENERAL	,
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	P-8	JP-8	3 + 100	JP-8 +	100 x4	FOR	JP-8	OBS	ERVATIO	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	C	C1	С	C1	C	C1			NE	NE	NSR
ACID NO. mgKOH/gm	NE	NE	NE	.001	.001	.001	.002	.003	.003		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	.6	.8	4.4	2.8	9.6	8.6		7	NE	NE	NSR
HYDROPEROXIDES mM/l	NE	NE	NE	.001	.002	0	.038	0	.018			NE	NE	NSR
CONDUCTIVITY pS/m @72°F	NE	NE	NE	100	66	248	131	912	410	150	600	NE	NE	NSR
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail DATE: 23 MAR 98
W = Within Allowable Requirement; O = Outside Allowable Requirement UDRI TECH: J. DUES

OT = Material Tested Beyond Temperature Range

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

UDRI P.I. ENG:

D.H. KALT

D.H. WALT

A.F. ALT, WALT

D.F. ALT,

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

A.F. AUT. W./MLSE: A. FLETCHER

A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. I.B.12 **MATERIAL / IDENTITY: BLADDER TANK, POLYESTER** TEST TEMPERATURE (°F) AIRFRAME, FUEL TANK BLADDER, STRUCTURAL CLOTH 200 USE: 28 BETZ DEARBORN 8Q462 (Normal & x4 Concentrations) 93/POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: TEST DATE START: 21 NOV 95 JP-8 BASELINE FUEL: 92 POSF 2926 +(JP-8 Additives)

	TEST MA	TERIAL / FUEL 1	EXPOSURE	TES	T EVALU	ATION CR	ITERIA			EVALUAT	ION OF TH	EST RES	ULTS	
MATERIAL		RESULTS		CONTROL MAT	A	LLOWABLE	E TOLERAN	ICE	COMPA	RISON TO CO	ONTROL &	(OVERALL	
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUII	REMENT		ALLOW	ABLE REQUI	REMENTS	EV	ALUATIO	N
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100 x4	JP8	+100	X4
TENSILE (PSI)	147	152	149	153	20%				-4%	-1%	-3%	W	W	W
ELONGATION (%)	15	14	14	16	35%				-6%	-13%	-13%	W	W	W
VOLUME SWELL (%)														
HARD'S; a) SHORE A (PTS)														
b) PENCIL														
COMP. SET (avg. 2 spcm's)														
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														•
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														

	TEST FUE	L / MATERIAL	EXPOSURE			CONT	ROL FUEL							
FUELS	4 X 7 DA	Y PERIODS (2	28 DAYS)		PRE (NEV	W) VS. POST	(STRESSED)	200°F 7 DAYS		SPECIFICAT	TON RANGE	(GENERAL	,
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	J]	P-8	JP-8	3 + 100	JP-8 +	100 x4	FOR	JP-8	OBS	ERVATIO	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	C	C1	С	C1	C	C1			NE	NE	NSR
ACID NO. mgKOH/gm	NE	NE	NE	.001	.001	.001	.002	.003	.003		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	.6	.8	4.4	2.8	9.6	8.6		7	NE	NE	NSR
HYDROPEROXIDES mM/l	NE	NE	NE	.001	.002	0	.038	0	.018			NE	NE	NSR
CONDUCTIVITY pS/m @72°F	NE	NE	NE	100	66	248	131	912	410	150	600	NE	NE	NSR
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: $\mathbf{C} =$ C1 - C6 = Light to Dark Clear

Designations: NE =Not Evaluated; ND = Not Detected; DATE: BD = Below Detection; P = Pass; F = Fail

23 MAR 98 W =Within Allowable Requirement; O = Outside Allowable Requirement **UDRI TECH:** J. DUES **Material Tested Beyond Temperature Range** OT = UDRI ENG: B. WILT

N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive ConcentrationUDRI P.I. ENG: D.H. KALT

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: A. FLETCHER Between Material Degradation and Fuel Properties Degradation A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. I.B.13 **MATERIAL / IDENTITY:** NYLON CLOTH AIRFRAME, FUEL SYSTEM, FUEL TANK BLADDER TEST TEMPERATURE (°F) 200 USE: 28 **TEST ADDITIVE/FUEL:** Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /92 POSF 2926 **EXPOSURE TIME (DAYS)** 92 POSF 2926 **TEST DATE START:** 7 JAN 97 JP-8 BASELINE FUEL: + (JP-8 Additives)

										,					
	TEST MAT	TERIAL / FUEL	EXPOSURE		TEST	EVALUA	TION CRIT	ERIA		EVAI	LUATIO	N OF TE	ST R	ESULT	ΓS
MATERIAL		RESULTS		CONTR	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	ONTROL &		OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIR	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	78	91	94	9	8	20%				-20%	-7%	-4%	W	W	W
ELONGATION (%)	15	17	17	3	1	35				-52%	-45%	-45%	OT	\mathbf{W}	W
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OI FIIFI								
				CONTROL FUEL						~					
FUELS		Y PERIODS (,				,			SPECI	FICATION	RANGE		GENERA!	
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JP-8			+ 100		100 x4		FOR JP-8			SERVATI	
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)				C	C1	C	C1	C	C1						

.001

4.4

0

248

.002

2.8

.032

131

.003

9.6

0

912

.003

8.6

.018

410

NOTES:

ACID NO. mgKOH/gm

HYDROPEROXIDES mM/l

CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

GUMS mg/100ml

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Not Evaluated: ND = Not Detected: **Designations:** NE =BD = Below Detection: P = Pass: F = Fail

W =Within Allowable Requirement; O = Outside Allowable Requirement

.001

.6

.001

100

OT =**Material Tested Beyond Temperature Range**

NSR = No Spec. Req. and/or 4 (x) Additive ConcentrationN/A =Not applicable;

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

DATE: 23 MAR 98 UDRI TECH: J. DUES UDRI ENG: B. WILT UDRI P.I. ENG: D.H. KALT A.F. AUT. W./MLSE: A. FLETCHER A.F. AUT. WL/POSF S. A. ANDERSON

150

0.015

7

600

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

.001

.8

.002

66

TEST PLAN I.D. NO. I.B.14 **MATERIAL / IDENTITY:** NYLON CLOTH TEST TEMPERATURE (°F) 200 **USE:** AIRFRAME, FUEL SYSTEM, FUEL TANK BLADDER STRUCTURE 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /92 POSF 2926 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL:** 92 POSF 2926 **TEST DATE START:** 7 JAN 97 JP-8 BASELINE FUEL: + (JP-8 Additives)

	TEST MAT	TERIAL / FUEL	EXPOSURE		TEST	EVALUA	TION CRIT	ERIA		EVAI	LUATIO	N OF TE	ST R	ESULT	rs
MATERIAL		RESULTS		CONTRO	OL MAT	AI	LOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	NTROL &	(OVERALI	Ĺ
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIR	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	90	104	106	10)6	20%				-15%	-2%	0%	W	W	W
ELONGATION (%)	14	14	13	1	5	35				-7 %	-7%	-13%	\mathbf{W}	W	W
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST FUEL	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								_
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV		STRESSED) °1	F 7 DAYS		SPECI	FICATION I	RANGE	(GENERAI	 L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JP	·-8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-8		OBS	SERVATIO	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
		+				<u> </u>			+				-		

	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL							
FUELS	4 X 7 DA	Y PERIODS ((28 DAYS)		PRE-NEV	V) VS. POST (STRESSED) °	F 7 DAYS		SPECIFICA	TION RANGE		GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR	2 JP-8	OB	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)				C	C1	C	C1	C	C1					
ACID NO. mgKOH/gm				.001	.001	.001	.002	.003	.003		0.015			
GUMS mg/100ml				.6	.8	4.4	2.8	9.6	8.6		7			
HYDROPEROXIDES mM/l				.001	.002	0	.032	0	.018					
CONDUCTIVITY pS/m @72°F				100	66	248	131	912	410	150	600			
VISUAL OBSERVATIONS														

DATE:

UDRI TECH:

UDRI P.I. ENG:

UDRI ENG:

23 MAR 98

J. DUES

B. WILT

A.F. AUT. W./MLSE: A. FLETCHER

D.H. KALT

NOTES:

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: Not Evaluated: ND = Not Detected: NE =BD = Below Detection: P = Pass: F = Fail

W =Within Allowable Requirement; O = Outside Allowable Requirement

OT =**Material Tested Beyond Temperature Range**

Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration N/A =

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO.	I.B.15	MATERIAL / IDENTITY:	NITRILE
TEST TEMPERATURE (°F)	AMBIENT	USE:	AIRFRAME, SELF SEALING BLADDER TANK, F-15
EXPOSURE TIME (DAYS)	N/A	TEST ADDITIVE/FUEL:	Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /92 POSF 2926
TEST DATE START:	6 JULY 98	JP-8 BASELINE FUEL:	92 POSF 2926 + (JP-8 Additives)

	TEST MAT	TERIAL / FUEL	EXPOSURE		TEST	EVALUA	TION CRIT	TERIA		EVAI	LUATIO	N OF TE	ST R	ESULT	rs
MATERIAL		RESULTS		CONTR	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO C	ONTROL &	(OVERALI	<u> </u>
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIE	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	IT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)															
ELONGATION (%)															<u> </u>
VOLUME SWELL (%)															ļ .
HARD'S; a) SHORE A (PTS)															
b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)														-	
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)														-	
VISUAL OBSERVATIONS	0	0	NE			0				P	P	NE	W	W	NE
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	V) VS. POST ((STRESSED) °	F 7 DAYS		SPECI	FICATION	RANGE		GENERAI	
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	.II.	2-8	IP-8	+ 100	IP-8 +	100 x4		FOR JP-8		OBS	SERVATIO	ONS
TROTERTT TESTS	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	TOKST-0	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	NE	NE	NE	NE	NE	NE				NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	NE	NE	NE	NE	NE	NE			0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	NE	NE	NE	NE	NE	NE			7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	NE	NE	NE	NE	NE	NE				NE	NE	NE
CONDUCTIVITY pS/m @72°F	NE	NE	NE	NE	NE	NE	NE	NE	NE	150		600	NE	NE	NE
VISUAL OBSERVATIONS	NE	NE	NE	NE	NE	NE	NE	NE	NE				NE	NE	NE

NOTES:

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

W = Within Allowable Requirement; O = Outside Allowable Requirement

OT = Material Tested Beyond Temperature Range

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation DATE: 23 MAR 98
UDRI TECH: J. DUES
UDRI ENG: B. WILT
UDRI P.I. ENG: D.H. KALT
A.F. AUT. W./MLSE: A. FLETCHER
A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO.	I.B.16	MATERIAL / IDENTITY:	POLYURETHANE
TEST TEMPERATURE (°F)	AMBIENT	USE:	AIRFRAME, SELF SEALING BLADDER TANK, F-15
EXPOSURE TIME (DAYS)	N/A	TEST ADDITIVE/FUEL:	Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /92 POSF 2926
TEST DATE START:	6 JULY 98	JP-8 BASELINE FUEL:	92 POSF 2926 + (JP-8 Additives)

	TEST MAT	FERIAL / FUEL	EXPOSURE		TEST	EVALUA	TION CRIT	TERIA		EVAI	LUATI	ON OF TE	ST R	ESULT	ΓS
MATERIAL		RESULTS		CONTR	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO	CONTROL &		OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIE	REMENT		ALLOWA	BLE REQ	UIREMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)														1	
ELONGATION (%)														·	
VOLUME SWELL (%)														1	
HARD'S; a) SHORE A (PTS)														·	
b) PENCIL														1	
COMP. SET (avg. 2 spcm's)														·	
LAP SHEAR (PSI)														1	
COHESION (%)															
TAPE ADHESION (P/F)														1	
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)														·	
RESISTIVITY (OHM-CM)														·	
TORQUE (INCH -LBS.)														1	
RUPTURE PRESS. (IN.HG)														<u> </u>	
VISUAL OBSERVATIONS	W	W	NE			0				P	P	NE	W	W	NE
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	W) VS. POST ((STRESSED) °	F 7 DAYS		SPECI	FICATIO	N RANGE	(GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	P-8	JP-8	+ 100	JP-8 +	100 x4		FOR JP	-8	OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	NE	NE	NE	NE	NE	NE				NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	NE	NE	NE	NE	NE	NE			0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	NE	NE	NE	NE	NE	NE			7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	NE	NE	NE	NE	NE	NE				NE	NE	NE
CONDUCTIVITY pS/m @72°F	NE	NE	NE	NE	NE	NE	NE	NE	NE	150		600	NE	NE	NE

NOTES:

VISUAL OBSERVATIONS

Fuel Color: C = Clear C1 - C6 = Light to Dark

NE

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

NE

W = Within Allowable Requirement; O = Outside Allowable Requirement

NE

OT = Material Tested Beyond Temperature Range

NE

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists
Between Material Degradation and Fuel Properties Degradation

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

NE

NE

NE

NE

NE

DATE:

UDRI TECH:

UDRI P.I. ENG:

UDRI ENG:

NE

4 AUG 98

J. DUES

B. WILT

A.F. AUT. W./MLSE: A. FLETCHER

A.F. AUT. WL/POSF S. A. ANDERSON

D.H. KALT

NE

NE

TEST EVALUATION CRITERIA

.038

131

0

912

.018

410

NSR

150

NSR

600

NE

NE

NE

NE

NSR

NSR

EVALUATION OF TEST RESULTS

TEST PLAN I.D. NO. I.C.1 / I.A.9 **MATERIAL / IDENTITY:** MIL-S-4383 NITRILE TEST TEMPERATURE (°F) 200 USE: AIRFRAME, INTEGRAL FUEL TANK COATING BETZ DEARBORN 8Q462 (Normal & x4 Concentrations)/93 POSF 2980 **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** TEST DATE START: 22 JUN 95 JP-8 BASELINE FUEL: 92 POSF 2926 +(JP-8 Additives)

MATERIAL		RESULTS		CONTRO	OL MAT	A	LLOWABLE	E TOLERAN	CE		MPARISO CONTROL			OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASUE	RED AT		REQUI	REMENT			ALLOWAB QUIREMI		E	VALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN'	Г ТЕМР	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100 x4	JP8	+100	X4
TENSILE (PSI)															
ELONGATION (%)															
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL	4B	4B	6B	21	H		3B			P	P	P	W	W	W
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)	F	P	P	P	1		P			F	P	P	0	W	W
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST FUE	L / MATERIAL	EXPOSURE			CONTRO	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (2	8 DAYS)		PRE (NEV		TRESSED) 200	°F 7 DAYS		SPECI	FICATION	RANGE		GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	.JP	-8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-	3	OB	SERVATI	IONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MI		MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	С	C1	С	C1	С	C1	NS	R	NSR	NE	NE	NSR
ACID NO. mgKOH/gm	NE	NE	NE	.001	.001	.001	.002	.003	.003	NS	R	0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	.6	.8	4.4	2.8	9.6	8.6	NS	R	7	NE	NE	NSR

NOTES:

HYDROPEROXIDES mM/I

CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

Fuel Color: $\mathbf{C} =$ C1 - C6 = Light to Dark

NE

NE

NE =Not Evaluated: ND = Not Detected: BD = Below Detection; P = Pass; F = FailDATE: 23 MAR 98 **Designations:** O = Outside Allowable Requirement UDRI TECH: W =Within Allowable Requirement; J. DUES UDRI ENG: B. WILT

.002

66

OT =**Material Tested Beyond Temperature Range**

NE

NE

NE

NE

.001

100

TEST MATERIAL / FUEL EXPOSURE

N/A =Not applicable: NSR = No Spec. Reg. and/or 4 (x) Additive ConcentrationUDRI P.I. ENG:

248

D.H. KALT * Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: A. FLETCHER Between Material Degradation and Fuel Properties Degradation A.F. AUT. WL/POSF S. A. ANDERSON

FUEL / MATERIAL COMPATIBILITY TEST RESULTS TEST PLAN I.D. NO. I.C.2 **MATERIAL / IDENTITY:** MIL-C-27725, POLYURETHANE TEST TEMPERATURE (°F) 200 USE: AIRFRAME, INTEGRAL FUEL TANK COATING **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** BETZ DEARBORN 8Q462 (Normal & x4 Concentrations)/93 POSF 2980 TEST DATE START: 22 NOV 94 JP-8 BASELINE FUEL: 93 POSF 2980 +(JP-8 Additives) TEST MATERIAL / FUEL EXPOSURE TEST EVALUATION CRITERIA **EVALUATION OF TEST RESULTS**

MATERIAL		RESULTS		CONTRO	DL MAT	A	LLOWABLE	E TOLERANO	CE		MPARISO CONTROI			OVERAI	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASUI	RED AT		REQUII	REMENT		A	LLOWAI QUIREMI	BLE	E	VALUAT	ION
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN'	Г ТЕМР	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100 x4	JP8	+100	X4
TENSILE (PSI)															
ELONGATION (%)															
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL	>6H	>6H	>6H	>6	H	0				P	P	P	W	W	W
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)	P	P	P	P)		P			P	P	P	W	W	W
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (2	28 DAYS)		PRE (NEV	V) VS. POST (S	TRESSED) 200	°F 7 DAYS		SPECII	FICATION	N RANGE		GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JP	-8	JP-8	+ 100	JP-8+	100 x4		FOR JP-	8	ОВ	SERVAT	IONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	N	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	С	C1	С	C1	С	C1	NSI	R	NSR	NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.002	.001	.002	.003	.003	NSI	R	0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	2	4.8	4.4	2.8	9.6	8.6	NSI	R	7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.004	.037	0	.038	0	.018	NSI	R	NSR	NE	NE	NE
CONDUCTIVITY pS/m @72°F	26	430	320	108	39	248	131	912	410	150	0	600	0	W	NSR

NOTES:

VISUAL OBSERVATIONS

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected;

W = Within Allowable Requirement;

BD = Below Detection; P = Pass; F = Fail O = Outside Allowable Requirement DATE: 23 MAR 98
UDRI TECH: J. DUES

OT = Material Tested Beyond Temperature Range

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

UDRI ENG:
UDRI P.I. ENG:
D.H. KALT
A F AUT WAMI SE:
A FLETCHED

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

A.F. AUT. W./MLSE: <u>A. FLETCHER</u>
A.F. AUT. WL/POSF <u>S. A. ANDERSON</u>

I.C.3 TEST PLAN I.D. NO. **MATERIAL / IDENTITY: EPOXY** TEST TEMPERATURE (°F) 200 USE: AIRFRAME, INTEGRAL FUEL TANK COATING 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: 22 NOV 94 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

	TEST MAT	FERIAL / FUEL	EXPOSURE	TEST	EVALUA	FION CRIT	ERIA		EVAI	LUATION	OF TE	ST R	ESUL	ΓS
MATERIAL		RESULTS		CONTROL MAT	A]	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	NTROL &		OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUIR	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)														
ELONGATION (%)														
VOLUME SWELL (%)														
HARD'S; a) SHORE A (PTS)														
b) PENCIL	>6H >6H >6H			>6H	0				P	P	P	W	W	W
COMP. SET (avg. 2 spcm's)														
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)	P	P	P	P		P			P	P	P	\mathbf{W}	W	\mathbf{W}
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														

	TEST FUEL	L / MATERIAL	EXPOSURE			CONTR	OL FUEL							
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	V) VS. POST (STRESSED) °	F 7 DAYS		SPECIFICA	TION RANGE		GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	JP-8 PRE POST		+ 100	JP-8 +	100 x4	FOR	2 JP-8	OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	С	C1	С	C1	С	C1	NSR	NSR	NE	NE	NSR
ACID NO. mgKOH/gm	NE	NE	NE	.001	.002	.001	.002	.003	.003	NSR	0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	2	4.8	4.4	2.8	9.6	8.6	NSR	7	NE	NE	NSR
HYDROPEROXIDES mM/l	NE	NE	NE	.004	.037	0	.038	0	.018	NSR		NE	NE	NSR
CONDUCTIVITY pS/m @72°F	NE	NE	NE	108	39	248	131	912	410	150	600	NE	NE	NSR
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

W =

Designations: NE =

Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = FailWithin Allowable Requirement; O = Outside Allowable Requirement

Material Tested Beyond Temperature Range OT =

N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration DATE: 23 MAR 98 UDRI TECH: J. DUES UDRI ENG: B. WILT UDRI P.I. ENG: D.H. KALT A.F. AUT. W./MLSE: __A. FLETCHER

A.F. AUT. WL/POSF S. A. ANDERSON

^{*} Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST EVALUATION CRITERIA

EVALUATION OF TEST RESULTS

TEST PLAN I.D. NO. I.C.4/I.D.2 **MATERIAL / IDENTITY:** MANGANESE, MIL-S-8802F TEST TEMPERATURE (°F) 200 USE: AIRFRAME, INTEGRAL FUEL TANK COATING/SEALANT 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL:** 9 JUN 94 93 POSF 2980 **TEST DATE START:** JP-8 BASELINE FUEL: + (JP-8 Additives)

MATERIAL		RESULTS		CONTR	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO C	ONTROL &	(OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIE	REMENT		ALLOWA	BLE REOU	IREMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	NT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	313	373	361	39	95		200			P	P	P	W	W	W
ELONGATION (%)	193	183	198	27	71		150%			P	P	P	\mathbf{W}	\mathbf{W}	W
VOLUME SWELL (%)	-15	-5	-5	N.	/A				8%	P	P	P	\mathbf{W}	\mathbf{W}	\mathbf{W}
HARD'S; a) SHORE A (PTS)	55	56	55	5	3		40Pts			P	P	P	\mathbf{W}	\mathbf{W}	\mathbf{W}
b) PENCIL														<u></u>	
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)														ĺ	
COHESION (%)	100	100	100	N.	/ A		100%			P	P	P	\mathbf{W}	\mathbf{W}	\mathbf{W}
TAPE ADHESION (P/F)														ĺ	
PEEL STRENGTH (LB/IN)	23	23	21	N.	/ A		20			P	P	P	W	W	W
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST ELLEI	L / MATERIAL	EXPOSIDE			CONTR	OI FIIFI								
							OL FUEL								
FUELS		Y PERIODS (,		PRE-NEV	W) VS. POST ((STRESSED) °	F 7 DAYS		SPECI	FICATION	RANGE		GENERA!	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)		2-8		+ 100		100 x4		FOR JP-8			SERVATI	
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	C	C1	C	C1	C	C1	NSR		NSR	NE	NE	NSR
ACID NO. mgKOH/gm	NE	NE	NE	.001	.002	.001	.002	.003	.003	NSR		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	2	4.8	4.4	2.8	9.6	8.6	NSR		7	NE	NE	NSR
HYDROPEROXIDES mM/l	NE	NE	NE	.004	.037	0	.038	0	.018	NSR			NE	NE	NSR
CONDUCTIVITY pS/m @72°F	NE	NE	NE	108	39	248	131	912	410	150		600	NE	NE	NSR

NOTES:

VISUAL OBSERVATIONS

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Not Evaluated: ND = Not Detected: **Designations:** NE =BD = Below Detection: P = Pass: F = Fail

W =Within Allowable Requirement; O = Outside Allowable Requirement

OT =**Material Tested Beyond Temperature Range**

TEST MATERIAL / FUEL EXPOSURE

N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: A. FLETCHER Between Material Degradation and Fuel Properties Degradation A.F. AUT. WL/POSF S. A. ANDERSON

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

DATE:

UDRI TECH:

UDRI P.I. ENG:

UDRI ENG:

23 MAR 98

J. DUES

B. WILT

D.H. KALT

FUEL / MATERIAL COMPATIBILITY TEST RESULTS TEST PLAN I.D. NO. I.C.5 **MATERIAL / IDENTITY:** PRE/COAT, POLYURETHANE TEST TEMPERATURE (°F) 200 USE: AIRFRAME, INTEGRAL FUEL TANK COATING **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** BETZ DEARBORN 8Q462 (Normal & x4 Concentrations)/ 93 POSF 2980 TEST DATE START: 5 JUN 95 JP-8 BASELINE FUEL: 92 POSF 2926 +(JP-8 Additives) TEST MATERIAL / FUEL EXPOSURE TEST EVALUATION CRITERIA **EVALUATION OF TEST RESULTS**

MATERIAL		RESULTS		CONTRO	OL MAT	A	LLOWABLI	E TOLERAN	CE)MPARIS(CONTROI			OVERAI	Ĺ L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUII	REMENT			ALLOWAI EQUIREM		Е	CVALUAT	ION
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100 x4	JP8	+100	X4
TENSILE (PSI)															
ELONGATION (%)															
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL	>6H	>6H	>6H	>6	Н	0				P	P	P	W	W	W
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)	P	P	P	F)		P			P	P	P	W	W	W
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST FUE	EL / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	AY PERIODS (2	28 DAYS)		PRE (NEV	W) VS. POST (S	TRESSED) 200	°F 7 DAYS		SPECI	FICATION	RANGE		GENER!	AL
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JP	·-8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-	8	OF	SERVAT	TONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MI	N	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	C	C1	С	C1	C	C1	NS	R	NSR	NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.002	.001	.002	.003	.003	NS	R	0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	.6	.8	4.4	2.8	9.6	8.6	NS	R	7	NE	NE	NE
HYDROPEROXIDES mM/I	NE	NE	NE	.001	.002	0	.038	0	.018	NS	R	NSR	NE	NE	NE
CONDUCTIVITY pS/m @72°F	NE	NE	NE	100	66	248	131	912	410	15	0	600	NE	NE	NE

NOTES:

VISUAL OBSERVATIONS

Fuel Color: $\mathbf{C} =$ C1 - C6 = Light to Dark

NE =Not Evaluated; ND = Not Detected; **Designations:**

W =Within Allowable Requirement; BD = Below Detection; P = Pass; F = Fail O = Outside Allowable Requirement

DATE: 23 MAR 98 **UDRI TECH:** J. DUES

OT =**Material Tested Beyond Temperature Range**

N/A =Not applicable: NSR = No Spec. Reg. and/or 4 (x) Additive Concentration UDRI ENG: B. WILT UDRI P.I. ENG: D.H. KALT

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: A. FLETCHER Between Material Degradation and Fuel Properties Degradation A.F. AUT. WL/POSF S. A. ANDERSON

FUEL / MATERIAL COMPATIBILITY TEST RESULTS TEST PLAN I.D. NO. I.C6 **MATERIAL / IDENTITY:** A-36 LAP WELD, EPOXY POLYAMIDE PAINT MIL-P-14441 TYPE III TEST TEMPERATURE (°F) 120 USE: GROUND BULK FUEL STORAGE 28 BETZ DEARBORN 8Q462 (Normal & x4 Concentrations)/ 92 POSF 2926 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL:** TEST DATE START: 29 JULY 98 JP-8 BASELINE FUEL: 92 POSF 2926 +(JP-8 Additives)

	TOTAL OF A STATE	TENTAL AND THE	CANDOCATOR												
	TEST MAT	TERIAL / FUEL 1	EXPOSURE				TION CRIT					TION OF			
MATERIAL		RESULTS		CONTRO	OL MAT	A	LLOWABLE	E TOLERAN	CE)MPARIS			OVERAI	L
	TD 0	JP-8 +100	JP8+100 (X4)	MEAGE	DED AT					II	CONTRO		_		
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	KED A I		REQUI	REMENT			ALLOWA EQUIREM		E	VALUAT	ION
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	Т ТЕМР	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100 x4	JP8	+100	X4
TENSILE (PSI)															
ELONGATION (%)															
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL	>6H	>6H	>6H	>6	Н		>6H			P	P	P	W	W	W
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)	P	P	P	F)		P			P	P	P	W	W	W
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS	P	P	P	F	•		P			P	P	P	W	W	W
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (2	28 DAYS)		PRE (NEV	V) VS. POST (S	TRESSED) 200	°F 7 DAYS		SPEC	FICATIO	N RANGE		GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JP	-8	JP-8	+ 100	JP-8 +	100 x4		FOR JP	-8	OF	SERVAT	IONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MI	IN	MAX	JP8	+100	X4
COLOR (7 DAYS)															
ACID NO. mgKOH/gm												0.015			
GUMS mg/100ml						_						7			
HYDROPEROXIDES mM/l															
CONDUCTIVITY pS/m @72°F										15	50	600			
VISUAL OBSERVATIONS															

NOTES:

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected;

W = Not Evaluated; ND = Not Detected; W = Within Allowable Requirement; BD = Below Detection; P = Pass; F = Fail O = Outside Allowable Requirement DATE: 10 SEPT 98
UDRI TECH: J. DUES
UDRI ENG: S. SALIBA

OT = Material Tested Beyond Temperature Range

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

UDRI P.I. ENG:

A.F. AUT. W./MLSE:

A.F. AUT. WL/POSF

S. A. ANDERSON

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

FUEL / MATERIAL COMPATIBILITY TEST RESULTS TEST PLAN I.D. NO. I.C6 **MATERIAL / IDENTITY:** A-36 LAP WELD, EPOXY POLYAMIDE PAINT MIL-P-14441 TYPE III TEST TEMPERATURE (°F) 120 USE: GROUND BULK FUEL STORAGE BETZ DEARBORN 80462 (Normal & x4 Concentrations)/ 92 POSF 2926 EXPOSURE TIME (DAYS) 28 TEST ADDITIVE/FUEL: TEST DATE START: 29 JULY 98 92 POSF 2926 +(JP-8 Additives) JP-8 BASELINE FUEL: TEST MATERIAL / FUEL EXPOSURE TEST EVALUATION CRITERIA **EVALUATION OF TEST RESULTS** RESULTS CONTROL MAT ALLOWABLE TOLERANCE COMPARISON TO OVERALL MATERIAL CONTROL & MEASURED AT PROPERTY TESTS JP-8 JP-8+100 JP8+100 (X4) REOUIREMENT ALLOWABLE EVALUATION REQUIREMENTS AMBIENT TEMP DECREASE MIN VALUE INCREASE MAX VALUE POST POST POST JP-8+100 JP-8+100 JP8 X4 (AVG. 5 SPECIMENS) +100 TENSILE (PSI) **ELONGATION (%) VOLUME SWELL (%)** HARD'S; a) SHORE A (PTS) b) PENCIL COMP. SET (avg. 2 spcm's) LAP SHEAR (PSI) COHESION (%) TAPE ADHESION (P/F) PEEL STRENGTH (LB/IN) LAMINAR SHEAR (PSI) RESISTIVITY (OHM-CM) TOROUE (INCH-LBS.) RUPTURE PRESS. (IN.HG) TABER ABRADER 0.087 0.055 0.062 0.085 0.090 P P P W W W Abraded gms/1000 cyc. TEST FUEL / MATERIAL EXPOSURE CONTROL FUEL **FUELS** 4 X 7 DAY PERIODS (28 DAYS) PRE (NEW) VS. POST (STRESSED) 200°F 7 DAYS SPECIFICATION RANGE GENERAL JP8+100 (X4) JP-8 JP-8+100 JP-8 JP - 8 + 100 x4FOR JP-8 PROPERTY TESTS* JP-8 + 100OBSERVATIONS POST POST POST PRE POST PRE POST PRE POST MIN MAX JP8 +100 X4 COLOR (7 DAYS) ACID NO. mgKOH/gm 0.015 GUMS mg/100ml 7 HYDROPEROXIDES mM/I CONDUCTIVITY pS/m @72°F 150 600

NOTES:

VISUAL OBSERVATIONS

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Not Evaluated; ND = Not Detected; **Designations:** NE =

> W =Within Allowable Requirement: OT =Material Tested Beyond Temperature Range

> Not applicable: NSR = No Spec. Reg. and/or 4 (x) Additive Concentration N/A =

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

BD = Below Detection; P = Pass; F = FailO = Outside Allowable Requirement

UDRI TECH: UDRI ENG: UDRI P.I. ENG:

DATE:

S. SALIBA D.H. KALT A.F. AUT. W./MLSE: A. FLETCHER

10 SEPT 98

J. DUES

A.F. AUT. WL/POSF S. A. ANDERSON

TEST EVALUATION CRITERIA

EVALUATION OF TEST RESULTS

TEST PLAN I.D. NO. I.D.1 **MATERIAL / IDENTITY:** MIL-S-8802F, DICROMATE TEST TEMPERATURE (°F) 200 USE: AIRFRAME, INTEGRAL FUEL TANK SEALANT 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /92 POSF 2926 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: 11 JUL 95 **TEST DATE START:** JP-8 BASELINE FUEL: 92 POSF 2926 + (JP-8 Additives)

MATERIAL		RESULTS		CONTRO	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	ONTROL &	•	OVERAL	<u> </u>
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIR	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	323	324	348	51	18		200 PSI			P	P	P	W	W	W
ELONGATION (%)	323	307	375	5(150%			P	P	P	\mathbf{W}	\mathbf{W}	\mathbf{W}
VOLUME SWELL (%)	1	0	1	N.	/ A				8%	P	P	P	\mathbf{W}	\mathbf{W}	\mathbf{W}
HARD'S; a) SHORE A (PTS)	49	59	55	6	2		30 Pts			P	P	P	\mathbf{W}	\mathbf{W}	\mathbf{W}
b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)	100	100	100	N/	/A		100%			P	P	P	\mathbf{W}	W	W
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)	40	41	42	N/	/ A		20 lb/in			P	P	P	W	W	W
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															,
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST BUE	L / MATERIAL	EVDOCUDE			CONTEN	OT EXIET			li .					
	TEST FUE	L/MATERIAL	EAFOSURE				OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	W) VS. POST (STRESSED) °I	F 7 DAYS		SPECI	FICATION	RANGE	•	GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JP	'-8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-8		OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	С	C1	С	C1	С	C1	NSR		NSR	NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.001	.001	.002	.003	.003	NSR		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	.6	.8	4.4	2.8	9.6	8.6	NSR		7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.001	.002	0	.038	0	.018	NSR		NSR	NE	NE	NE
CONDUCTIVITY pS/m @72°F	NE	NE	NE	100	66	248	131	912	410	150		600	NE	NE	NE

NOTES:

VISUAL OBSERVATIONS

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Not Evaluated: ND = Not Detected: **Designations:** NE =BD = Below Detection: P = Pass: F = Fail

W =Within Allowable Requirement; O = Outside Allowable Requirement

OT =**Material Tested Beyond Temperature Range**

TEST MATERIAL / FUEL EXPOSURE

N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

UDRI P.I. ENG: D.H. KALT * Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: A. FLETCHER **Between Material Degradation and Fuel Properties Degradation** A.F. AUT. WL/POSF S. A. ANDERSON

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

DATE:

UDRI TECH:

UDRI ENG:

23 MAR 98

J. DUES

B. WILT

TEST PLAN I.D. NO. I.D.2/I.C.4 **MATERIAL / IDENTITY:** MIL-S-8802, MANGANESE TEST TEMPERATURE (°F) 200 USE: AIRFRAME, INTEGRAL FUEL TANK SEALANT/COATING 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **TEST ADDITIVE/FUEL: EXPOSURE TIME (DAYS)** 9 JUN '94 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

	TEST MA	FERIAL / FUEL	EXPOSURE	TEST	Γ EVALUA	TION CRIT	TERIA		EVAl	LUATIO	N OF TE	ST R	ESUL	ΓS
MATERIAL		RESULTS		CONTROL MAT	A	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	NTROL &	(OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUIR	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	VALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	313	373	361	395	%	200PSI			P	P	P	W	W	W
ELONGATION (%)	193	183	198	271		150%			P	P	P	\mathbf{W}	W	W
VOLUME SWELL (%)	-15	-5	-5	N/A				8%	P	P	P	\mathbf{W}	W	\mathbf{W}
HARD'S; a) SHORE A (PTS)	55	56	55	53		30 Pts			P	P	P	\mathbf{W}	W	W
b) PENCIL														
COMP. SET (avg. 2 spcm's)														
LAP SHEAR (PSI)														
COHESION (%)	100	100	100	N/A		100%			P	P	P	\mathbf{W}	W	W
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)	23	23	21	N/A		20 lb/in			P	P	P	\mathbf{W}	W	W
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														
	TEST FUE	L / MATERIAL	EXPOSURE		CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS ((28 DAYS)	PRE-NEW) VS. POST (S	TRESSED) 200	°F 7 DAYS		SPEC	IFICATION I	RANGE		GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JP-8	JP-8	+ 100	JP-8 +	100 x4	1	FOR JP-8		OBS	SERVATI	ONS

	TEST FUEL	L / MATERIAL	EXPOSURE			CONTR	OL FUEL							
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEW)	VS. POST (ST	TRESSED) 200	°F 7 DAYS		SPECIFICAT	TION RANGE		GENERA	<u>L</u>
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	?-8	JP-8	+ 100	JP-8 +	100 x4	FOR	JP-8	OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	C	C1	C	C1	C	C1			NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.002	.001	.002	.003	.003	NSR	0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	2	4.8	4.4	2.8	9.6	8.6		7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.004	.037	0	.038	0	.018			NE	NE	NE
CONDUCTIVITY pS/m @72°F	25	293	460	108	39	248	131	912	410	150	600	О	W	NSR
VISUAL OBSERVATIONS													1	

NOTES:

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Not Evaluated: ND = Not Detected: **Designations:** NE =BD = Below Detection: P = Pass: F = Fail

W =Within Allowable Requirement; O = Outside Allowable Requirement OT =

Material Tested Beyond Temperature Range

Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration N/A =* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

DATE: 23 MAR 98 UDRI TECH: J. DUES UDRI ENG: B. WILT UDRI P.I. ENG: D.H. KALT A.F. AUT. W./MLSE: A. FLETCHER A.F. AUT. WL/POSF S. A. ANDERSON

TEST EVALUATION CRITERIA

TEST PLAN I.D. NO. I.D.3 **MATERIAL / IDENTITY:** MANGANESE, MIL-S-8340A TEST TEMPERATURE (°F) 200 USE: AIRFRAME, INTEGRAL FUEL TANK SEALANT 28 **TEST ADDITIVE/FUEL:** Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** 17 NOV 94 93 POSF 2980 **TEST DATE START:** JP-8 BASELINE FUEL: + (JP-8 Additives)

					1251	DVILLETI	HON CKI	Litti		EVAL	JUATIO	OF IL) I I	ESUL.	10
MATERIAL		RESULTS		CONTRO	OL MAT	AI	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	NTROL &		OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIR	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	338	394	351	39)4		200 PSI			P	P	P	W	W	W
ELONGATION (%)	194	212	187	28	88		150%			P	P	P	\mathbf{W}	W	W
VOLUME SWELL (%)	-6	-6	-7	N.	'A				8%	P	P	P	\mathbf{W}	W	W
HARD'S; a) SHORE A (PTS)	53	55	55	5	4		30 Pts			P	P	P	\mathbf{W}	W	\mathbf{W}
b) PENCIL															
COMP. SET (avg. 2 spc m's)															
LAP SHEAR (PSI)															
COHESION (%)	100	100	100	N/	'A		100%			P	P	P	W	W	W
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)	29	28	27	N/	'A		20 lb/in			P	P	P	W	W	W
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST FUEL	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
					DDE ME		_	E E DANG		ann ar			11	~====== ·	_
FUELS		Y PERIODS (,	STRESSED) °I	1		SPECI	FICATION I	RANGE		GENERA	
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JP			+ 100		100 x4		FOR JP-8			SERVATI	
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4

 \mathbf{C}

.001

4.4

0

248

C1

.002

2.8

.038

131

 \mathbf{C}

.003

9.6

0

912

C1

.003

8.6

.018

410

DATE:

NOTES:

COLOR (7 DAYS)

GUMS mg/100ml

ACID NO. mgKOH/gm

HYDROPEROXIDES mM/l

CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

Fuel Color: C = Clear C1 - C6 = Light to Dark

C2

.002

15.2

.019

30

C2

.014

45.8

0

460

C

.001

2

.004

108

W = Within Allowable Requirement; O = Outside Allowable Requirement OT = Material Tested Beyond Temperature Range

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

C2

.011

43.6

0

259

TEST MATERIAL / FUEL EXPOSURE

UDRI TECH:
UDRI ENG:
UDRI P.I. ENG:
A.F. AUT. W./MLSE:
A.F. AUT. WL/POSF
S. A. ANDERSON

NSR

NSR

NSR

NSR

150

EVALUATION OF TEST RESULTS

NSR

0.016

7

NSR

600

23 MAR 98

NE

NE

0

W

0

NE

NE

0

W

W

NE

NE NSR

W

NSR

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

C1

.002

4.8

.037

TEST EVALUATION CRITERIA

EVALUATION OF TEST RESULTS

TEST PLAN I.D. NO. I.D.5 **MATERIAL / IDENTITY:** PRIMER, FLOUROSILICONE TEST TEMPERATURE (°F) 200 USE: AIRFRAME, INTEGRAL FUEL TANK SEALANT 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: 4 SEP 95 **TEST DATE START:** JP-8 BASELINE FUEL: 92 POSF 2926 + (JP-8 Additives)

MATERIAL		RESULTS		CONTRO	OL MAT	AI	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	NTROL &	1 .	OVERALI	<u> </u>
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT	111	REQUIR	-	CL		BLE REOUI			/ALUATIO	
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
·									VALUE		_				<u> </u>
TENSILE (PSI)	511	453	609	64	-		200 PSI			P	P	P	W	W	W
ELONGATION (%)	290	265	336	35			150%			P	P	P	W	W	W
VOLUME SWELL (%)	-13	-19	-24	N/	'A				8%	P	P	P	W	W	W
HARD'S; a) SHORE A (PTS)	45	44	66	4	5		40 Pts			P	P	P	\mathbf{W}	W	\mathbf{W}
b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)	100	100	100	N/	'A		100%			P	P	P	W	W	W
TAPE ADHESION (P/F)														·	
PEEL STRENGTH (LB/IN)	17	20	22	N/	'A		10 lb/in			P	P	P	W	W	W
LAMINAR SHEAR (PSI)														·	
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)														İ	
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS														<u> </u>	
	TEST EUE	L / MATERIAL	EXPOSURE			CONTR	OI FIIFI			1					
							OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	V) VS. POST (STRESSED) °	F 7 DAYS		SPECI	FICATION 1	RANGE	١ (GENERAI	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JP	·-8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-8		OBS	SERVATIO	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	С	C1	С	C1	С	C1	NSR		NSR	NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.001	.001	.002	.003	.003	NSR		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	.6	.8	4.4	2.8	9.6	8.6	NSR		7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.001	.002	0	.038	0	.018	NSR		NSR	NE	NE	NE

NOTES:

CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

Fuel Color: C = Clear C1 - C6 = Light to Dark

NE

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

NE

W = Within Allowable Requirement; O = Outside Allowable Requirement

OT = Material Tested Beyond Temperature Range

NE

TEST MATERIAL / FUEL EXPOSURE

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

A.F. AUT. WL/POSF

S. A. ANDERSON

100

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

66

248

131

912

410

DATE:

UDRI TECH:

UDRI P.I. ENG:

UDRI ENG:

150

600

23 MAR 98

J. DUES

B. WILT

D.H. KALT

NE

NE

NE

TEST PLAN I.D. NO. **I.D.6 MATERIAL / IDENTITY:** POLYURETHANE, SPRAY SEALANT, AMS 3279 TEST TEMPERATURE (°F) 160 USE: AIRFRAME, INTEGRAL FUEL TANK SEALANT 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /92 POSF 2926 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL:** 2 APR 98 92 POSF 2926 **TEST DATE START:** JP-8 BASELINE FUEL: + (JP-8 Additives)

	TEST MA	TERIAL / FUEL	EXPOSURE	TEST	EVALUA	TION CRIT	ERIA		EVAI	LUATION	OF TE	ST R	ESUL	ΓS
MATERIAL		RESULTS		CONTROL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	NTROL &	(OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUIF	REMENT		ALLOWA	BLE REQUII	REMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)														
ELONGATION (%)														
VOLUME SWELL (%)														
HARD'S; a) SHORE A (PTS)														
b) PENCIL														
COMP. SET (avg. 2 spcm's)														
LAP SHEAR (PSI)														
COHESION (%)	100	100	100	NE		100			P	P	P	W	W	W
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)	20	14	16			12			P	P	P	W	W	W
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														
	TEST FUE	L / MATERIAL	EXPOSURE		CONTR	OL FUEL			11					

	TEST FUEL	L / MATERIAL	EXPOSURE			CONTRO	OL FUEL							
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	V) VS. POST (STRESSED) °I	F 7 DAYS		SPECIFICAT	TION RANGE	1 (GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR	JP-8	OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	NE	NE	NE	NE	NE	NE			NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	NE	NE	NE	NE	NE	NE		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	NE	NE	NE	NE	NE	NE		7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	NE	NE	NE	NE	NE	NE			NE	NE	NE
CONDUCTIVITY pS/m @72°F	NE	NE	NE	NE	NE	NE	NE	NE	NE	150	600	NE	NE	NE
VISUAL OBSERVATIONS	NE	NE	NE	NE	NE	NE	NE	NE	NE			NE	NE	NE

NOTES:

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

W = Within Allowable Requirement; O = Outside Allowable Requirement

OT = Material Tested Beyond Temperature Range

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

UDRI P.I. ENG:

A.F. AUT. W./MLSE:

A.F. AUT. WL/POSF

S. A. ANDERSON

4 AUG 98

J. DUES

B. WILT

DATE:

UDRI TECH:

UDRI ENG:

TEST PLAN I.D. NO. **I.D.6 MATERIAL / IDENTITY:** POLYURETHANE, SPRAY SEALANT, AMS 3279 TEST TEMPERATURE (°F) 200 USE: AIRFRAME, INTEGRAL FUEL TANK SEALANT 28 **TEST ADDITIVE/FUEL:** Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** 29 DEC 95 92 POSF 2926 **TEST DATE START:** JP-8 BASELINE FUEL: + (JP-8 Additives)

	TEST MAT	TERIAL / FUEL	EXPOSURE		TEST	T EVALUA'	TION CRIT	ERIA		EVAI	LUATIO	N OF TES	ST R	ESUL	ΓS
MATERIAL		RESULTS		CONTRO	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	ONTROL &	(OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASUI	RED AT		REQUIF	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	247	214	265	45	1		200 PSI			P	P	P	W	W	W
ELONGATION (%)	620	532	702	86	3		150%			P	P	P	\mathbf{W}	\mathbf{W}	\mathbf{W}
VOLUME SWELL (%)	14	12	14	N/	'A				15%	P	P	P	\mathbf{W}	\mathbf{W}	\mathbf{W}
HARD'S; a) SHORE A (PTS) b) PENCIL	56	52	55	6	7		40 Pts			P	P	P	W	W	W
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	W) VS. POST ((STRESSED) °	F 7 DAYS		SPECI	FICATION	RANGE	(GENERA	<u> </u>
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JP	-8	JP-8	+ 100	JP-8 +	- 100 x4		FOR JP-8		OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4

 \mathbf{C}

.001

4.4

0

248

C1

.002

2.8

.038

131

 \mathbf{C}

.003

9.6

0

912

C1

.003

8.6

.018

410

DATE:

UDRI TECH:

UDRI P.I. ENG:

UDRI ENG:

NSR

NSR

NSR

NSR

150

NSR

0.015

7

NSR

600

23 MAR 98

J. DUES

B. WILT

D.H. KALT

NE

NOTES:

COLOR (7 DAYS)

GUMS mg/100ml

ACID NO. mgKOH/gm

HYDROPEROXIDES mM/l

CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

Fuel Color: C = Clear C1 - C6 = Light to Dark

NE

NE

NE

NE

NE

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

NE

NE

NE

NE

NE

W = Within Allowable Requirement; O = Outside Allowable Requirement

 \mathbf{C}

.001

.6

.001

100

OT = Material Tested Beyond Temperature Range

NE

NE

NE

NE

NE

TECT MATERIAL / PHEL EXPOSIDE

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

A.F. AUT. WL/POSF

S. A. ANDERSON

C1

.001

.8

.002

66

TEST PLAN I.D. NO. I.D.7 **MATERIAL / IDENTITY:** POLYTHIOETHER, SEALANT, AMS 3277 TEST TEMPERATURE (°F) 200 USE: AIRFRAME, INTEGRAL FUEL TANK, SEALANT 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: 18 NOV 94 93 POSF 2980 **TEST DATE START:** JP-8 BASELINE FUEL: + (JP-8 Additives)

	TEST MAT	FERIAL / FUEL	EXPOSURE		TEST	EVALUA	TION CRIT	ΓERIA		EVA	LUATIO	N OF TE	ST R	ESUL	ΓS
MATERIAL		RESULTS		CONTR	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	RISON TO CO	ONTROL &	(OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	JRED AT		REQUI	REMENT		ALLOWA	ABLE REQUI	REMENTS	EV	VALUATI	ION
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIE	NT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	324	309	295	3	38		125			P	P	P	W	W	W
ELONGATION (%)	215	194	213	3	23		100			P	P	P	W	W	W
VOLUME SWELL (%)	6	7	5	N	I/A				25	P	P	P	W	W	W
HARD'S; a) SHORE A (PTS)	40	40	40	4	48		30			P	P	P	W	W	W
b) PENCIL															<u> </u>
COMP. SET (avg. 2 spcm's)														<u> </u>	<u> </u>
LAP SHEAR (PSI)														<u> </u>	
COHESION (%)	100	100	100	N	I/A		100			P	P	P	\mathbf{W}	W	\mathbf{W}
TAPE ADHESION (P/F)														<u> </u>	
PEEL STRENGTH (LB/IN)	40	44	50	N	I/A		20			P	P	P	W	W	\mathbf{W}
LAMINAR SHEAR (PSI)														<u> </u>	
RESISTIVITY (OHM-CM)														<u> </u>	ļ
TORQUE (INCH -LBS.)														<u> </u>	ļ
RUPTURE PRESS. (IN.HG)														<u> </u>	ļ
VISUAL OBSERVATIONS	<u> </u>													<u> </u>	<u> </u>
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	W) VS. POST ((STRESSED) °	F 7 DAYS		SPEC	IFICATION	RANGE		GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	J	P-8	JP-8	+ 100	JP-8 +	100 x4	1	FOR JP-8		OBS	SERVATI	IONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)				С	C1	С	C1	С	C1						
ACID NO. mgKOH/gm				.001	.002	.001	.002	.003	.003			0.015			
GUMS mg/100ml				2	4.8	4.4	2.8	9.6	8.6			7			

NOTES:

HYDROPEROXIDES mM/l

CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected;

Within Allowable Requirement; W =

BD = Below Detection; P = Pass; F = FailO = Outside Allowable Requirement

0

248

.038

131

0

912

.018

410

DATE: 23 MAR 98 **UDRI TECH:** J. DUES

150

600

OT =**Material Tested Beyond Temperature Range**

N/A =Not applicable; NSR = No Spec. Reg. and/or 4 (x) Additive Concentration **UDRI ENG:** B. WILT UDRI P.I. ENG: D.H. KALT A.F. AUT. W./MLSE: __A. FLETCHER

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

A.F. AUT. WL/POSF S. A. ANDERSON

Between Material Degradation and Fuel Properties Degradation

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

.037

39

.004

TEST EVALUATION ODITEDIA

TEST PLAN I.D. NO. I.D.8 **MATERIAL / IDENTITY:** POLYSULFIDE, AMS 3281 TEST TEMPERATURE (°F) 160 USE: AIRFRAME, INTEGRAL FUEL TANK SEALANT 28 **TEST ADDITIVE/FUEL:** Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** 17 JUN 96 **TEST DATE START:** JP-8 BASELINE FUEL: 92 POSF 2926 + (JP-8 Additives)

	IESI MAI	ERIAL / FUEL	EXPOSURE		TEST	EVALUA	TION CRIT	ERIA		EVAI	LUATIO	N OF TE	ST R	ESULI	<u>rs</u>
MATERIAL		RESULTS		CONTR	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	ONTROL &	(OVERALI	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIR	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	NT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	229	241	244	20	66		200 PSI			P	P	P	W	W	W
ELONGATION (%)	409	386	386	59	96		150%			P	P	P	\mathbf{W}	W	W
VOLUME SWELL (%)	6	5	5	N	/A				8%	P	P	P	\mathbf{W}	\mathbf{W}	\mathbf{W}
HARD'S; a) SHORE A (PTS) b) PENCIL	47	47	49	3	8		30 Pts			P	P	P	W	W	W
COMP. SET (avg. 2 spcm's)														-	
LAP SHEAR (PSI)															
COHESION (%)	100	100	94	N	/A		100%			P	P	F	W	W	0
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)	38	37	31	N	/A		20 lb/in			P	P	P	W	W	W
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	W) VS. POST ((STRESSED) °1	F 7 DAYS		SPECI	FICATION	RANGE		GENERAI	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	P-8	JP-8	+ 100	JP-8 +	100 x4	1	FOR JP-8		OBS	SERVATIO	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	С	C1	С	C1	С	C1	NSR		NSR	NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	NE	.001	.002	.003	.003	NSR		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	.6	NE	4.4	5.2	9.6	12.4	NSR		7	NE	NE	NE

0

242

.01

NE

0

912

ND

NE

DATE:

UDRI TECH:

UDRI ENG:

NOTES:

HYDROPEROXIDES mM/l

CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

Fuel Color: C = Clear C1 - C6 = Light to Dark

NE

NE

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

NE

NE

W = Within Allowable Requirement; O = Outside Allowable Requirement

.001

100

OT = Material Tested Beyond Temperature Range

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

NE

NE

TEST MATERIAL / FUEL EXPOSURE

UDRI P.I. ENG:
A.F. AUT. W./MLSE:
A.F. AUT. WL/POSF
A.F. AUT. WL/POSF
S. A. ANDERSON

NSR

150

EVALUATION OF TECT DECIUTE

NE

NE

NE

NE

NE

NE

NSR

600

23 MAR 98

J. DUES

B. WILT

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

NE

NE

TEST EVALUATION CRITERIA

EVALUATION OF TEST RESULTS

TEST PLAN I.D. NO. I.D.8 **MATERIAL / IDENTITY: POLYSULFIDE, AMS 3281** TEST TEMPERATURE (°F) 200 USE: AIRFRAME, INTEGRAL FUEL TANK SEALANT 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: 13 JUL 95 **TEST DATE START:** JP-8 BASELINE FUEL: 92 POSF 2926 + (JP-8 Additives)

MATERIAL		RESULTS		CONTROL MAT MEASURED AT		Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	ONTROL &		OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIR	REMENT		ALLOWA	BLE REQU	REMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	151	151	158	26			200 PSI			F	F	F	OT	OT	OT
ELONGATION (%)	555	615	576	59	96		150%			P	P	P	\mathbf{W}	W	\mathbf{W}
VOLUME SWELL (%)	8	8	7	N	/ A				8%	P	P	P	\mathbf{W}	\mathbf{W}	\mathbf{W}
HARD'S; a) SHORE A (PTS)	28	24	27	3	8		30 Pts			F	F	F	OT	OT	OT
b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)	100	100	100	N	/ A		100%			P	P	P	\mathbf{W}	W	\mathbf{W}
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)	28	31	30	N/	/A		20 lb/in			P	P	P	W	W	W
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	W) VS. POST (STRESSED) °I	F 7 DAYS		SPECI	FICATION	RANGE		GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JP	- -8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-8		OBS	SERVATION	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	С	C1	С	C1	С	C1	NSR		NSR	NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.001	.001	.002	.003	.003	NSR		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	.6	.8	4.4	2.8	9.6	8.6	NSR		7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.001	.002	0	.038	0	.018	NSR		NSR	NE	NE	NE

NOTES:

CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

NE

Not Evaluated: ND = Not Detected: **Designations:** NE =BD = Below Detection: P = Pass: F = Fail

NE

W =Within Allowable Requirement; O = Outside Allowable Requirement

100

OT =**Material Tested Beyond Temperature Range**

NE

TEST MATERIAL / FUEL EXPOSURE

N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: A. FLETCHER A.F. AUT. WL/POSF S. A. ANDERSON

66

Between Material Degradation and Fuel Properties Degradation

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

248

131

912

410

DATE:

UDRI TECH:

UDRI P.I. ENG:

UDRI ENG:

150

600

23 MAR 98

J. DUES

B. WILT

D.H. KALT

NE

NE

NE

TEST PLAN I.D. NO. I.D.9 **MATERIAL / IDENTITY:** POLYSULFIDE, AMS 3265 TEST TEMPERATURE (°F) 160 USE: AIRFRAME, INTEGRAL FUEL TANK SEALANT 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL:** 4 JUL 96 92 POSF 2926 **TEST DATE START:** JP-8 BASELINE FUEL: + (JP-8 Additives)

	TEST MAT	TERIAL / FUEL	EXPOSURE	TEST	EVALUA'	TION CRIT	ERIA		EVAI	LUATION	OF TES	ST R	ESULT	rs
MATERIAL		RESULTS		CONTROL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	NTROL &	(OVERALI	Ĺ
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUIR	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	435	452	464	370		200 PSI			P	P	P	W	W	W
ELONGATION (%)	326	309	315	420		150%			P	P	P	W	W	W
VOLUME SWELL (%)	-2	-2	-2	N/A				8%	P	P	P	\mathbf{W}	W	W
HARD'S; a) SHORE A (PTS)	60	59	61	52		30 Pts			P	P	P	\mathbf{W}	W	W
b) PENCIL														
COMP. SET (avg. 2 spcm's)														
LAP SHEAR (PSI)														
COHESION (%)	100	100	94	N/A		100%			P	P	F	\mathbf{W}	W	О
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)	40	41	40	N/A		20 lb/in			P	P	P	\mathbf{W}	W	W
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														
` ′														

	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL							
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	V) VS. POST (STRESSED) °I	F 7 DAYS		SPECIFICA'	TION RANGE		GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR	2 JP-8	OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	C1	C1	С	C1	С	C1	С	C1	NSR	NSR	NE	W	W
ACID NO. mgKOH/gm	NE	.004	.004	.001	NE	.001	.002	.003	.003	NSR	0.015	NE	W	W
GUMS mg/100ml	NE	6.4	14.8	.6	NE	4.4	5.2	9.6	12.4	NSR	7	NE	W	NS
														R
HYDROPEROXIDES mM/l	NE	NE	NE	.001	NE	0	.01	0	ND	NSR	NSR	NE	W	W
CONDUCTIVITY pS/m @72°F	NE	365	662	100	NE	242	NE	912	NE	150	600	NE	W	О
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

NE =Not Evaluated; ND = Not Detected; DATE: **Designations:** BD = Below Detection; P = Pass; F = Fail23 MAR 98 Within Allowable Requirement; **UDRI TECH:** W =O = Outside Allowable Requirement J. DUES

OT =**Material Tested Beyond Temperature Range UDRI ENG:** B. WILT Not applicable; N/A =NSR = No Spec. Req. and/or 4 (x) Additive ConcentrationUDRI P.I. ENG: D.H. KALT

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: __A. FLETCHER Between Material Degradation and Fuel Properties Degradation A.F. AUT. WL/POSF _S. A. ANDERSON

TEST EVALUATION CRITERIA

TEST PLAN I.D. NO. I.D.9 **MATERIAL / IDENTITY: POLYSULFIDE, AMS 3265** TEST TEMPERATURE (°F) 200 USE: AIRFRAME, INTEGRAL FUEL TANK SEALANT 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: 12 JUL 95 **TEST DATE START:** JP-8 BASELINE FUEL: 92 POSF 2926 + (JP-8 Additives)

MATERIAL		RESULTS		CONTR	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	NTROL &	(OVERALI	
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIR	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	NT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	310	414	410	37	70		200 PSI			P	P	P	W	W	W
ELONGATION (%)	136	152	156	43	32		150%			F	P	P	OT	W	W
VOLUME SWELL (%)	-12	-11	-13	N.	/A				8%	P	P	P	\mathbf{W}	W	W
HARD'S; a) SHORE A (PTS)	72	73	76	5	52		30 Pts			P	P	P	W	W	W
b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)	100	100	100	N.	/A		100%			P	P	P	W	W	W
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)	15	16	15	N.	/A		20 lb/in			F	F	F	ОТ	OT	OT
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
		. /3.6.4 (DED.) 1.4.1	EVENOCIEDE				<u> </u>			li	•	•			
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	W) VS. POST	(STRESSED) °	F 7 DAYS		SPECI	FICATION I	RANGE	(GENERAI	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JF	P-8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-8		OBS	ERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	С	C1	С	C1	С	C1	NSR		NSR	NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.001	.001	.002	.003	.003	NSR		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	.6	.8	4.4	2.8	9.6	8.6	NSR		7	NE	NE	NE
HIVDD OPED OVIDER				004	000	_	0.00	_	0.4.0	2102					2.75

0

248

.038

131

0

912

.018

410

NOTES:

HYDROPEROXIDES mM/I

CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

NE

NE

Not Evaluated: ND = Not Detected: **Designations:** NE =BD = Below Detection: P = Pass: F = Fail

NE

NE

W =Within Allowable Requirement; O = Outside Allowable Requirement

.001

100

OT =**Material Tested Beyond Temperature Range**

NE

NE

TEST MATERIAL / FUEL EXPOSURE

N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

DATE: 23 MAR 98 UDRI TECH: J. DUES UDRI ENG: B. WILT UDRI P.I. ENG: D.H. KALT A.F. AUT. W./MLSE: A. FLETCHER A.F. AUT. WL/POSF S. A. ANDERSON

NSR

600

NE

NE

NE

NE

NE

NE

NSR

150

EVALUATION OF TEST RESULTS

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

.002

TEST PLAN I.D. NO. I.D.10 MATERIAL / IDENTITY: POLYSULFIDE, SEALANT, AMS 3283 TEST TEMPERATURE (°F) 200 USE: AIRFRAME, INTEGRAL FUEL TANK SEALANT 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL:** 5 JUN 96 92 POSF 2926 **TEST DATE START:** JP-8 BASELINE FUEL: + (JP-8 Additives)

	TEST MAT	TERIAL / FUEL	EXPOSURE		TEST	'EVALUA'	TION CRIT	TERIA		EVAI	LUATIO	N OF TE	ST R	ESUL	ΓS
MATERIAL		RESULTS		CONTR	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	ONTROL &	(OVERAL	
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIR	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)															
ELONGATION (%)															
VOLUME SWELL (%)	0	4	7	N.	/A				8%	P	P	P	\mathbf{W}	W	\mathbf{W}
HARD'S; a) SHORE A (PTS)															
b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)	15.6	19.9	18.7	10	.4		3.5 "Hg			P	P	P	W	W	\mathbf{W}
VISUAL OBSERVATIONS															
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	V) VS. POST	(STRESSED) °	F 7 DAYS		SPECI	FICATION	RANGE	(GENERA	
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JF	- -8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-8		OBS	ERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	С	C1	C	C1	С	C1	NSR		NSR	NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.001	.001	.002	.003	.003	NSR		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	.6	.8	4.4	2.8	9.6	8.6	NSR		7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.001	.002	0	.038	0	.018	NSR		NSR	NE	NE	NE
CONDUCTIVITY pS/m @72°F	NE	NE	NE	100	66	248	131	912	410	150		600	NE	NE	NE

NOTES:

VISUAL OBSERVATIONS

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

W = Within Allowable Requirement; O = Outside Allowable Requirement

OT = Material Tested Beyond Temperature Range

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

A.F. AUT. WL/POSF

S. A. ANDERSON

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

DATE:

UDRI TECH:

UDRI P.I. ENG:

UDRI ENG:

23 MAR 98

J. DUES

B. WILT

D.H. KALT

TEST PLAN I.D. NO. I.D.11 MATERIAL / IDENTITY: FLOUROSILICONE, MIL-S-85334 AIRFRAME, INTEGRAL FUEL TANK SEALANT TEST TEMPERATURE (°F) 200 USE: 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL:** 28 JUN 95 92 POSF 2926 **TEST DATE START:** JP-8 BASELINE FUEL: + (JP-8 Additives)

	TEST MAT	TERIAL / FUEL	EXPOSURE		TEST	'EVALUA'	TION CRIT	ERIA		EVAI	LUATIO	N OF TE	ST R	ESUL?	rs -
MATERIAL		RESULTS		CONTR	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO C	ONTROL &	(OVERALI	
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIR	REMENT		ALLOWA	BLE REOU	REMENTS	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)															
ELONGATION (%)															
VOLUME SWELL (%)	12	13	13	N.	/A				12%	P	F	F	\mathbf{W}	W	W
HARD'S; a) SHORE A (PTS)															
b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)	33.90	39.67	36.20	35.	.13		3.5 "Hg			P	P	P	\mathbf{W}	W	W
VISUAL OBSERVATIONS															
	TEST FUEL	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	W) VS. POST (STRESSED) °I	F 7 DAYS		SPECI	FICATION	RANGE	(GENERAI	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JF	P-8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-8		OBS	SERVATION	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	С	C1	С	C1	С	C1	NSR		NSR	NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.001	.001	.002	.003	.003	NSR		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	.6	.8	4.4	2.8	9.6	8.6	NSR		7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.001	.002	0	.038	0	.018	NSR		NSR	NE	NE	NE
CONDUCTIVITY pS/m @72°F	NE	NE	NE	100	66	248	131	912	410	150		600	NE	NE	NE

NOTES:

VISUAL OBSERVATIONS

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Not Evaluated: ND = Not Detected: **Designations:** NE =BD = Below Detection: P = Pass: F = Fail

Within Allowable Requirement; W =O = Outside Allowable Requirement

OT =**Material Tested Beyond Temperature Range**

Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration N/A =

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: A. FLETCHER A.F. AUT. WL/POSF S. A. ANDERSON

Between Material Degradation and Fuel Properties Degradation

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

DATE:

UDRI TECH:

UDRI P.I. ENG:

UDRI ENG:

23 MAR 98

J. DUES

B. WILT

D.H. KALT

TEST EVALUATION CRITERIA

EVALUATION OF TEST RESULTS

TEST PLAN I.D. NO. **I.E.1 MATERIAL / IDENTITY:** AS4 / 3501-6 EPOXY GRAPHITE TEST TEMPERATURE (°F) 200 USE: AIRFRAME, INTEGRAL FUEL TANK, COMPOSITE Betz/De arborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 28 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: 9 JUN 94 93 POSF 2980 **TEST DATE START:** JP-8 BASELINE FUEL: + (JP-8 Additives)

					1201	LVIILLOII	11011 01111			LVAL	CATIO	II OF ILE	31 I	LOULI	10
MATERIAL		RESULTS		CONTRO	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPARI	ISON TO CO	ONTROL &	(OVERALI	ւ
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIR	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)															
ELONGATION (%)															
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)	9267	9792	9625	11,	141	20%				-17	-12	-14	\mathbf{W}	W	W
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
BUBBLE PT,IN H2O															
	TEST FILE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
													П		
FUELS		Y PERIODS (PRE-NEV	W) VS. POST ((STRESSED) °1	F7 DAYS		SPECI	FICATION	RANGE	'	GENERAI	Ĺ
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	_	P-8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-8			SERVATION	
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	C	C1	C	C1	C	C1	NSR		NSR	NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.002	.002	.003	.003	.003	NSR		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	2	4.8	4.4	2.8	9.6	8.6	NSR		7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.004	.037	0	.038	0	.018	NSR		NSR	NE	NE	NE

NOTES:

CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

45

Not Evaluated: ND = Not Detected: **Designations:** NE =BD = Below Detection: P = Pass:

375

W =Within Allowable Requirement; O = Outside Allowable Requirement

108

OT =**Material Tested Beyond Temperature Range**

153

TEST MATERIAL / FUEL EXPOSURE

N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

B. WILT UDRI P.I. ENG: D.H. KALT A.F. AUT. W./MLSE: A. FLETCHER A.F. AUT. WL/POSF S. A. ANDERSON

912

410

DATE:

UDRI TECH:

UDRI ENG:

150

600

24 MAR 98

J. DUES

O

 \mathbf{W}

 \mathbf{W}

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

39

248

TEST PLAN I.D. NO. **I.E.2 MATERIAL / IDENTITY:** IM7 /5250-4 (BMI) GRAPHIE BISMALIEMIDE TEST TEMPERATURE (°F) 200 USE: AIRFRAME, INTEGRAL FUEL TANK, COMPOSITE 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: 9 JUN 94 93 POSF 2980 **TEST DATE START:** JP-8 BASELINE FUEL: + (JP-8 Additives)

	TEST MAT	TERIAL / FUEL	EXPOSURE		TEST	EVALUA	TION CRIT	ERIA		EVAI	LUATIO	N OF TES	ST R	ESULT	ΓS
MATERIAL		RESULTS		CONTRO	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	ONTROL &		OVERAL	Ĺ
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIR	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)															
ELONGATION (%)															,
VOLUME SWELL (%)															,
HARD'S; a) SHORE A (PTS)															
b) PENCIL															,
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)	10,950	12,000	12,330	12,	330	20%				-12	-3	0	W	W	W
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															,
RUPTURE PRESS. (IN.HG)															
BUBBLE PT,IN H2O															,
	TECT DITE	L / MATERIAL	EVDOCUDE			CONTEN	OF EVEL			li		•			
							OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	V) VS. POST ((STRESSED) °	F 7 DAYS		SPECI	FICATION 1	RANGE	•	GENERA:	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JP	P-8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-8		OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	C	C1	C	C1	C	C1	NSR		NSR	NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.002	.001	.002	.003	.003	NSR		0.015	NE	NE	NE

4.4

0

248

2.8

.032

131

9.6

0

912

8.6

.018

410

NOTES:

GUMS mg/100ml

HYDROPEROXIDES mM/l

CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

Fuel Color: C = Clear C1 - C6 = Light to Dark

NE

NE

55

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

NE

NE

392

W = Within Allowable Requirement; O = Outside Allowable Requirement

2

.004

108

OT = Material Tested Beyond Temperature Range

NE

NE

161

TECT MATERIAL / PHEL EXPOSIDE

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation DATE: 24 MAR 98
UDRI TECH: J. DUES
UDRI ENG: B. WILT
UDRI P.I. ENG: D.H. KALT
A.F. AUT. W./MLSE: A. FLETCHER
A.F. AUT. WL/POSF S. A. ANDERSON

NSR

NSR

150

7

NSR

600

NE

NE

0

NE

NE

 \mathbf{W}

NE

NE

 \mathbf{W}

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

4.8

.037

TEST PLAN I.D. NO. **I.E.3 MATERIAL / IDENTITY:** AS-7 / 8551-7A EPOXY GRAPHITE TEST TEMPERATURE (°F) 200 USE: AIRFRAME, INTEGRAL FUEL TANK, COMPOSITE 28 **TEST ADDITIVE/FUEL:** Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** 93 POSF 2980 **TEST DATE START:** 1 Dec 94 JP-8 BASELINE FUEL: + (JP-8 Additives)

	TEST MAT	TERIAL / FUEL	EXPOSURE		TEST	EVALUA	TION CRIT	TERIA		EVAI	LUATIO	N OF TE	ST R	ESUL	ΓS
MATERIAL		RESULTS		CONTRO	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	ONTROL &	(OVERAL	
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIR	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)															
ELONGATION (%)															
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)	11,190	10,710	11,470	11,	220	20%				-3	-5	+2	\mathbf{W}	W	W
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
BUBBLE PT,IN H2O															
	TEST FUEL	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
													0		
FUELS		Y PERIODS (,		PRE-NEV	v) vs. post ((STRESSED) °1	F7 DAYS		SPECI	FICATION	RANGE	· '	GENERA!	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JP			+ 100		100 x4		FOR JP-8			SERVATI	
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	C	C1	C	C1	С	C1	NSR		NSR	NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.002	.001	.002	.003	.003	NSR		0.015	NE	NE	NE

4.4

0

248

2.8

.032

131

9.6

0

912

8.6

.018

410

NOTES:

GUMS mg/100ml

HYDROPEROXIDES mM/l

CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

Fuel Color: C = Clear C1 - C6 = Light to Dark

NE

NE

NE

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = F

NE

NE

NE

W = Within Allowable Requirement; O = Outside Allowable Requirement
OT = Material Tested Beyond Temperature Range

2

.004

108

OT = Material Tested Beyond Temperature Range N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

NE

NE

NE

Between Material Degradation and Fuel Properties Degradation

DATE: 24 MAR 98
UDRI TECH: J. DUES
UDRI ENG: B. WILT
UDRI P.I. ENG: D.H. KALT
A.F. AUT. W./MLSE: A. FLETCHER
A.F. AUT. WL/POSF S. A. ANDERSON

NSR

NSR

150

7

NSR

600

NE

NE

NE

NE

NE

NE

NE

NE

NE

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

4.8

.037

TEST PLAN I.D. NO. I.F.1.1 **MATERIAL / IDENTITY:** F-100 ENGINE FUEL FILTER TEST TEMPERATURE (°F) 250 USE: **ENGINE FUEL FILTER F-100 ENGINE (P&W)** 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /92 POSF 2926 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: 18 NOV 97 92 POSF 2926 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

	TEST MAT	TERIAL / FUEL	EXPOSURE	TEST	EVALUA	TION CRIT	ERIA		EVAI	LUATION	OF TES	ST R	ESULT	ΓS
MATERIAL		RESULTS		CONTROL MAT	AI	LOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	NTROL &	(OVERALI	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUIR	REMENT		ALLOWA	BLE REQUIF	REMENTS	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)														
ELONGATION (%)														
VOLUME SWELL (%)														
HARD'S; a) SHORE A (PTS)														
b) PENCIL														
COMP. SET (avg. 2 spcm's)														
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
BUBBLE PT,IN H2O	3.8		4.0	£3.3" H2O		3.3			P		P	\mathbf{W}		\mathbf{W}

	TEST FUEL	L / MATERIAL	EXPOSURE			CONTRO)L FUEL							
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	V) VS. POST (S	STRESSED) °I	F 7 DAYS		SPECIFICAT	TION RANGE		GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	2-8	JP-8	+ 100	JP-8 +	100 x4	FOR	JP-8	OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)				С	C1	С	C1	С	C1					
ACID NO. mgKOH/gm				.001	.001	.001	.002	.003	.003		0.015			
GUMS mg/100ml				.6	.8	4.4	2.8	9.6	8.6		7			
HYDROPEROXIDES mM/l				.001	.002	0	.032	0	.018					
CONDUCTIVITY pS/m @72°F				100	66	248	131	912	410	150	600			
VISUAL OBSERVATIONS														

NOTES:

 $\mathbf{C} =$ C1 - C6 = Light to Dark **Fuel Color:** Clear

Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = FailDATE: **Designations:** NE =23 MAR 98 W =Within Allowable Requirement; O = Outside Allowable Requirement UDRI TECH: J. DUES **Material Tested Beyond Temperature Range** OT =UDRI ENG: B. WILT

> N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

D.H. KALT UDRI P.I. ENG: * Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: __A. FLETCHER Between Material Degradation and Fuel Properties Degradation A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. I.F.1.2 **MATERIAL / IDENTITY:** F-110 ENGINE FUEL FILTER TEST TEMPERATURE (°F) 250 **USE:** ENGINE, FUEL FILTER F-110 (GE) 28 **TEST ADDITIVE/FUEL:** Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /92 POSF 2926 **EXPOSURE TIME (DAYS)** 18 NOV 97 92 POSF 2926 **TEST DATE START:** JP-8 BASELINE FUEL: + (JP-8 Additives)

								,									
	TEST MAT	TERIAL / FUEL	EXPOSURE	TEST	Γ EVALUA	TION CRIT	TERIA		EVA	LUATIO	N OF TE	ST R	ESULT	ΓS			
MATERIAL		RESULTS		CONTROL MAT	A	LLOWABLE	TOLERAN	ICE	COMPAR	ISON TO CO	NTROL &	(OVERALI	L			
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUI	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATIO	ON			
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4			
TENSILE (PSI)																	
ELONGATION (%)																	
VOLUME SWELL (%)																	
HARD'S; a) SHORE A (PTS)																	
b) PENCIL																	
COMP. SET (avg. 2 spcm's)																	
LAP SHEAR (PSI)																	
COHESION (%)																	
TAPE ADHESION (P/F)																	
PEEL STRENGTH (LB/IN)																	
LAMINAR SHEAR (PSI)																	
RESISTIVITY (OHM-CM)																	
TORQUE (INCH -LBS.)																	
RUPTURE PRESS. (IN.HG)																	
BUBBLE PT,IN H2O	3.5		4.0	£3.3" H2O		3.3			P			W					
	TEST FUE	L / MATERIAL	EXPOSURE		CONTR	OL FUEL											
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)	PRE-NE	W) VS. POST	(STRESSED) °	F 7 DAYS		SPEC	IFICATION I	RANGE		GENERAI	L			
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JP-8	JP-8	3 + 100	JP-8 +	- 100 x4		FOR JP-8		OBS	SERVATIO	ONS			
	DOGE.	DOGE	DOGE			1	-		3.673.7		3 5 1 37	TDO	100	374			

	TEST FUEL	L / MATERIAL	EXPOSURE			CONTR	OL FUEL							
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	W) VS. POST (STRESSED) °	F 7 DAYS		SPECIFICA'	TION RANGE		GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR	2 JP-8	OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)				C	C1	С	C1	С	C1					\top
ACID NO. mgKOH/gm				.001	.001	.001	.002	.003	.003		0.015			
GUMS mg/100ml				.6	.8	4.4	2.8	9.6	8.6		7			
HYDROPEROXIDES mM/l				.001	.002	0	.032	0	.018					
CONDUCTIVITY pS/m @72°F				100	66	248	131	912	410	150	600			
VISUAL OBSERVATIONS														

DATE:

UDRI TECH:

UDRI P.I. ENG:

UDRI ENG:

23 MAR 98

J. DUES

B. WILT

D.H. KALT

NOTES:

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

W = Within Allowable Requirement; O = Outside Allowable Requirement

OT = Material Tested Beyond Temperature Range

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

A.F. AUT. W./MLSE: A. FLETCHER

A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO.	I.F.2	MATERIAL / IDENTITY:	T700 HELICOPTER ENGINE FUEL FILTER
TEST TEMPERATURE (°F)	250	USE:	ENGINE FUEL FILTER, T700 HELICOPTER
EXPOSURE TIME (DAYS)	28	TEST ADDITIVE/FUEL:	Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /92 POSF 2926
TEST DATE START:	14 AUG 97	JP-8 BASELINE FUEL:	92 POSF 2926 + (JP-8 Additives)

	TEST MAT	TERIAL / FUEL	EXPOSURE		TEST	EVALUA	TION CRIT	TERIA		EVAl	LUATI	ON OF TE	ST R	ESUL	ΓS
MATERIAL		RESULTS		CONTR	OL MAT	AI	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO	CONTROL &		OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REOUII	REMENT		ALLOWA	BLE REO	UIREMENTS	E	VALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	NT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+10		JP8	+100	X4
TENSILE (PSI)															
ELONGATION (%)															
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
BUBBLE PT,IN H2O	4.4		4.8	з4.2°	'H2O		4.2			P		P	W		W
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS ((28 DAYS)		PRE-NEV	W) VS. POST (STRESSED) °	F 7 DAYS		SPEC	IFICATIO	N RANGE	1	GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	.II.	P-8	JP-8	+ 100	.IP-8 +	100 x4	1	FOR JP	-8	OB	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)				С	C1	С	C1	С	C1						
ACID NO. mgKOH/gm				.001	.001	.001	.002	.003	.003			0.015			
GUMS mg/100ml				.6	.8	4.4	2.8	9.6	8.6			7			
HYDROPEROXIDES mM/l				.001	.002	0	.032	0	.018						
															_

NOTES:

CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

W = Within Allowable Requirement; O = Outside Allowable Requirement
OT = Material Tested Beyond Temperature Range

100

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

DATE: 23 MAR 98
UDRI TECH: J. DUES
UDRI ENG: B. WILT
UDRI P.I. ENG: D.H. KALT
A.F. AUT. W/MLSE: A. FLETCHER
A.F. AUT. WL/POSF S. A. ANDERSON

600

150

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

66

248

131

912

0.015

7

NSR

600

24 MAR 98

J. DUES

B. WILT

D.H. KALT

NE

NE

NE

0

NE

NE

NE

 \mathbf{W}

NE

NE

NE

 \mathbf{W}

TEST PLAN I.D. NO. **I.F.3 MATERIAL / IDENTITY:** YELLOW TYPE II, POLYESTER, MIL-B-83054 TEST TEMPERATURE (°F) 200 USE: AIRFRAME, FUEL TANK ESM (FOAM) POLYURETHANE BETZ DEARBORN 8Q462 (Normal and x4 Concentrations)/93 POSF 2980 28 **TEST ADDITIVE/FUEL: EXPOSURE TIME (DAYS)** 9 JUN '94 **TEST DATE START:** JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

	TEST MAT	TERIAL / FUEL	EXPOSURE		TEST	EVALUA	TION CRIT	TERIA		EVAI	LUATIO	N OF TE	ST R	ESUL	ΓS
MATERIAL		RESULTS		CONTR	OL MAT	A.	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	NTROL &		OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIF	REMENT		ALLOWA	BLE REQUI	REMENTS	E	VALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	NT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	14	13	14	1	6	45%				-13	-19	-13	W	W	W
ELONGATION (%)	296	280	283	2'	74	40%				+8	+2	+3	\mathbf{W}	W	W
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)	NE	NE	NE	N	E										
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL			1					
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEW) VS. POST (S	TRESSED) 200	0°F 7 DAYS		SPECI	FICATION	RANGE		GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	P-8	JP-8	+ 100	JP-8 +	100 x4	1	FOR JP-8		OB	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	С	C1	С	C1	С	C1	NSR		NSR	NE	NE	NE

.001

4.4

0

248

.002

2.8

.038

131

.003

8.6

.018

410

DATE:

UDRI TECH:

UDRI P.I. ENG:

UDRI ENG:

.003

9.6

0

912

NSR

NSR

NSR

150

VISUAL OBSERVATIONS NOTES:

ACID NO. mgKOH/gm

HYDROPEROXIDES mM/l

CONDUCTIVITY pS/m @72°F

GUMS mg/100ml

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

NE

NE

NE

33

Not Evaluated: ND = Not Detected: **Designations:** NE =BD = Below Detection: P = Pass: F = Fail

NE

NE

NE

337

W =Within Allowable Requirement; O = Outside Allowable Requirement

.001

2

.004

108

OT =**Material Tested Beyond Temperature Range**

NE

NE

NE

258

NSR = No Spec. Req. and/or 4 (x) Additive ConcentrationN/A =Not applicable;

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: A. FLETCHER Between Material Degradation and Fuel Properties Degradation A.F. AUT. WL/POSF S. A. ANDERSON

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

.002

4.8

.037

TEST EVALUATION CRITERIA

TEST PLAN I.D. NO. **I.F.4 MATERIAL / IDENTITY: BLUE TYPE IV, POLYETHER, MIL-B-83054** TEST TEMPERATURE (°F) 200 USE: AIRFRAME, FUEL TANK ESM (FOAM) POLYURETHANE BETZ DEARBORN 8Q462 (Normal and x4 Concentrations)/93 POSF 2980 28 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: 9 JUN '94 **TEST DATE START:** JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

PROPERTY TESTS	OLIS	ALO	<u> </u>	1 OF IE	UATIO	LVAL			HON CINI	LVILLETI	ILDI					
CAVG. 5 SPECIMENS POST POST POST AMBIENT TEMP DECREASE MIN VALUE NCREASE MAX VALUE NCREASE MAX VALUE NCREASE MIN VALUE NCREASE NCREASE MIN VALUE NCREASE NCREASE	ERALL	OVI	1	NTROL &	SON TO CO	COMPARI	CE	TOLERAN	LOWABLE	AI	OL MAT	CONTRO		RESULTS		MATERIAL
TENSILE (PSI) 9 8 9 9 45% 0 -11 0 W V ELONGATION (%) 103 113 132 115 40% -10 -2 +15 W V VOLUME SWELL (%) -10 -2 +15 W V V VOLUME SWELL (%) -10 -2 +15 W V V VOLUME SWELL (%) -10 -2 +15 W V V V V V V V V V V V V V V V V V V	LUATION	EVAL	E	REMENTS	BLE REQUIF	ALLOWAI		EMENT	REQUIR		RED AT	MEASU	JP8+100 (X4)	JP-8 +100	JP-8	PROPERTY TESTS
ELONGATION (%) 103 113 132 115 40% -10 -2 +15 W NOUME SWELL (%)	+100 X4	+	JP8	JP-8+100x4	JP-8+100	JP-8		INCREASE	MIN VALUE	DECREASE	Т ТЕМР	AMBIEN	POST	POST	POST	(AVG. 5 SPECIMENS)
VOLUME SWELL (%)	W W		W	0	-11	0				45%)	9	9	8	9	TENSILE (PSI)
HARD'S; a) SHORE A (PTS)	W		W	+15	-2	-10				40%	5	11	132	113	103	
Description																VOLUME SWELL (%)
COMP, SET (avg. 2 spcm's)																HARD'S; a) SHORE A (PTS)
LAP SHEAR (PSI)																b) PENCIL
COHESION (%)																
TAPE ADHESION (P/F)																LAP SHEAR (PSI)
PEEL STRENGTH (LB/IN)																COHESION (%)
LAMINAR SHEAR (PSI)																TAPE ADHESION (P/F)
RESISTIVITY (OHM-CM)																PEEL STRENGTH (LB/IN)
TORQUE (INCH - LBS.) Image: Control of the control of th																LAMINAR SHEAR (PSI)
RUPTURE PRESS. (IN.HG) Image: Control of the control of											E	N	NE	NE	NE	RESISTIVITY (OHM-CM)
VISUAL OBSERVATIONS TEST FUEL / MATERIAL EXPOSURE CONTROL FUEL FUELS 4 X 7 DAY PERIODS (28 DAYS) PRE-NEW) VS. POST (STRESSED) 200°F 7 DAYS SPECIFICATION RANGE GEN PROPERTY TESTS* JP-8 JP-8+100 (X4) JP-8+100 JP-8+100 X4 FOR JP-8 OBSERVATIONS																TORQUE (INCH -LBS.)
TEST FUEL / MATERIAL EXPOSURE CONTROL FUEL																RUPTURE PRESS. (IN.HG)
FUELS 4 X 7 DAY PERIODS (28 DAYS) PRE-NEW) VS. POST (STRESSED) 200°F 7 DAYS SPECIFICATION RANGE GEN PROPERTY TESTS* JP-8 JP-8+100 (X4) JP-8 JP-8+100 JP-8+100 x4 FOR JP-8 OBSERV																VISUAL OBSERVATIONS
PROPERTY TESTS* JP-8 JP-8+100 JP8+100 (X4) JP-8 JP-8 + 100 JP-8 + 100 x4 FOR JP-8 OBSERVE									OL FUEL	CONTR			EXPOSURE	L / MATERIAL	TEST FUEL	
FROFER 1 12313 31-0+100 31-0+100A4 1-0K31-0 OBSER	NERAL	GEN	1	RANGE	FICATION R	SPECII		°F 7 DAYS	TRESSED) 200	VS. POST (ST	PRE-NEW)		28 DAYS)	Y PERIODS (2	4 X 7 DA	FUELS
POCE POCE POCE PDD PO	RVATIONS	BSER	OB		FOR JP-8		100 x4	JP-8 +	+ 100	JP-8	·-8	JP	JP8+100 (X4)	JP-8 +100	JP-8	PROPERTY TESTS*
POST POST PRE POST PRE POST PRE POST MIN MAX JP8 +	+100 X4	+	JP8	MAX		MIN	POST	PRE	POST	PRE	POST	PRE	POST	POST	POST	
COLOR (7 DAYS) NE NE NE C C1 C C1 NSR NSR NE NE	NE NE]	NE	NSR		NSR	C1	C	C1	C	C1	С	NE	NE	NE	COLOR (7 DAYS)
ACID NO. mgKOH/gm NE NE NE .001 .002 .001 .002 .003 .003 NSR 0.015 NE N	NE NE	1 1	NE	0.015		NSR	.003	.003	.002	.001	.002	.001	NE	NE	NE	ACID NO. mgKOH/gm

4.4

0

248

2.8

.038

131

9.6

0

912

8.6

.018

410

NOTES:

GUMS mg/100ml

HYDROPEROXIDES mM/I

CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

NE

NE

105

Not Evaluated: ND = Not Detected: **Designations:** NE =BD = Below Detection: P = Pass:

NE

NE

470

W =Within Allowable Requirement; O = Outside Allowable Requirement OT =

Material Tested Beyond Temperature Range

N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration * Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

2

.004

108

Between Material Degradation and Fuel Properties Degradation

NE

NE

304

TEST MATERIAL / FUEL EXPOSURE

23 MAR 98 DATE: UDRI TECH: J. DUES UDRI ENG: B. WILT UDRI P.I. ENG: D.H. KALT A.F. AUT. W./MLSE: A. FLETCHER A.F. AUT. WL/POSF S. A. ANDERSON

NSR

NSR

150

EVALUATION OF TEST RESULTS

7

NSR

600

NE

NE

0

NE

NE

 \mathbf{W}

NE

NE

 \mathbf{W}

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

4.8

.037

TEST PLAN I.D. NO. I.F.5 **MATERIAL / IDENTITY:** GRAY CLASS 1, POLYESTER, MIL-F-87260 TEST TEMPERATURE (°F) 200 USE: AIRFRAME, FUEL TANK ESM (FOAM) POLYURETHANE 28 **TEST ADDITIVE/FUEL:** Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)**

9 JUN 94 93 POSF 2980 **TEST DATE START:** JP-8 BASELINE FUEL: + (JP-8 Additives)

	TEST MAT	ERIAL / FUEL	EXPOSURE		TEST	EVALUA	TION CRIT	TERIA		EVAL	UATIO	N OF TE	ST R	ESUL	ΓS
MATERIAL		RESULTS		CONTRO	OL MAT	AI	LLOWABLE	TOLERAN	CE	COMPARI	SON TO CO	ONTROL &	(OVERAL	$\overline{\mathbb{L}}$
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIR	REMENT		ALLOWAI	BLE REQUI	REMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	11	11	11	1	5	45%				-27	-27	-27	W	W	W
ELONGATION (%)	87	92	85	11	18	40				-26	-22	-28	\mathbf{W}	W	W
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)	3.92E11	3.98E11	3.06E11	1.29	E11				1.0E12	P	P	P	\mathbf{W}	W	W
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST ELLEI	L / MATERIAL	EXPOSIDE			CONTED	OI BUBI			1					
							OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	V) VS. POST (STRESSED) °	F 7 DAYS		SPECII	FICATION 1	RANGE	•	GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JP	'-8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-8		OBS	ERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	C	C1	C	C1	C	C1	NSR		NSR	NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.002	.001	.002	.003	.003	NSR		0.015	NE	NE	NE

4.4

0

248

BD = Below Detection: P = Pass: F = Fail

2.8

.038

131

9.6

0

912

8.6

.018

410

DATE:

NSR

NSR

150

7

NSR

600

23 MAR 98

J. DUES

B. WILT

NE

NE

0

NE

NE

 \mathbf{W}

NE

NE

 \mathbf{W}

NOTES:

GUMS mg/100ml

HYDROPEROXIDES mM/l

CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

C1 - C6 = Light to Dark Fuel Color: C =

NE

NE

112

Designations: NE = Not Evaluated; ND = Not Detected;

UDRI TECH: W =Within Allowable Requirement; O = Outside Allowable Requirement UDRI ENG:

4.8

.037

39

Material Tested Beyond Temperature Range OT =

NE

NE

289

Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration N/A =

NE

NE

494

2

.004

108

UDRI P.I. ENG: D.H. KALT * Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: A. FLETCHER **Between Material Degradation and Fuel Properties Degradation** A.F. AUT. WL/POSF S. A. ANDERSON

TEST EVALUATION CRITERIA

EVALUATION OF TEST RESULTS

A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. **I.F.6 MATERIAL / IDENTITY:** GREY CLASS I1, POLYESTER, MIL-F-87260 TEST TEMPERATURE (°F) 200 USE: AIRFRAME, FUEL TANK ESM (FOAM) POLYURETHANE 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL:

27 FEB 96 93 POSF 2980 **TEST DATE START:** JP-8 BASELINE FUEL: + (JP-8 Additives)

	TEST WAY	EXIAL / FUEL	E2H OBCKE		IESI	EVALUA	HON CRI	EKIA		EVAI	JUATIO	N OF TE	51 K	F20L	15
MATERIAL		RESULTS		CONTR	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO C	ONTROL &	(OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIR	REMENT		ALLOWA	BLE REQU	IREMENTS	EV	VALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	NT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	8	8	8	1	.4	45%				-43	-43	-43	W	W	W
ELONGATION (%)	96	89	90	14	46	40%				-34	-39	-38	\mathbf{W}	\mathbf{W}	W
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)	4.75E11	5.43EII	7.82EII	2.45	EII				1.0E12	P	P	P	\mathbf{W}	W	W
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAVS)		PRE-NEV	W) VS. POST (STRESSED) °I	F 7 DAYS		SPECI	FICATION	RANCE		GENERA	T
	JP-8	JP-8 +100	JP8+100 (X4)	77	2-8		+ 100		100 x4	SILCI	FOR JP-8			SERVATI	
PROPERTY TESTS*	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	FUR JP-8	MAX	JP8	+100	X4
	1031	1031	1031	PKE	POST	rke	POST	PKE	POST	MIN		MAX	310	+100	Α4
COLOR (7 DAYS)	NE	NE	NE	C	C1	C	C1	C	C1	NSR		NSR	NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.001	.001	.002	.003	.003	NSR		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	.6	.8	4.4	2.8	9.6	8.6	NSR		7	NE	NE	NE
HYDROPEROXIDES mM/I	NE	NE	NE	.001	.02	0	.038	0	.018	NSR		NSR	NE	NE	NE
CONDUCTIVITY pS/m @72°F	NE	NE	NE	100	66	248	131	912	410	150		600	NE	NE	NE

NOTES:

VISUAL OBSERVATIONS

Fuel Color: C =C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection: P = Pass: F = FailDATE: 24 MAR 98 W =Within Allowable Requirement; O = Outside Allowable Requirement UDRI TECH: J. DUES Material Tested Beyond Temperature Range OT =**UDRI ENG:** B. WILT

TEST MATERIAL / FUEL EXPOSURE

Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration UDRI P.I. ENG: N/A =D.H. KALT A.F. AUT. W./MLSE: A. FLETCHER

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. I.F.9 **MATERIAL / IDENTITY:** BEIGE, TYPE II CHARACTERISTICS POLYESTER, URETHANE TEST TEMPERATURE (°F) 160 USE: AIRFRAME, FUEL TANK ESM (FOAM) 28 **TEST ADDITIVE/FUEL:** Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /92 POSF 2926 **EXPOSURE TIME (DAYS)** 28 MAY 98 92 POSF 2926 **TEST DATE START:** JP-8 BASELINE FUEL: + (JP-8 Additives)

	TEST MAT	ERIAL / FUEL	EXPOSURE		TEST	Γ EVALUA'	TION CRIT	TERIA		EVAl	LUATIO	N OF TE	ST R	ESUL	ΓS
MATERIAL		RESULTS		CONTR	OL MAT	A	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	ONTROL &	(OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	JRED AT		REQUII	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIE	NT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	17	17	14	2	24	45				-29%	-29%	-42%	W	W	W
ELONGATION (%)	396	389	390	3	69	40				+7%	+3%	+2%	\mathbf{W}	W	\mathbf{W}
VOLUME SWELL (%)														1	
HARD'S; a) SHORE A (PTS)															
b) PENCIL														1	
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)														1	
RESISTIVITY (OHM-CM)	4.75E11	5.43EII	7.82EII	2.4	5EII				1.0E12	P	P	P	W	W	W
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST FUE	L / MATERIAL	EXPOSURE	I		CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS ((28 DAYS)		PRE-NE	W) VS. POST		F 7 DAYS		SPEC	IFICATION 1	RANGE	(GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	J.	P-8	JP-8	+ 100	JP-8 +	- 100 x4	1	FOR JP-8		OBS	SERVATI	ONS
, , , , , , , , , , , , , , , , , , ,	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)		_													
ACID NO. mgKOH/gm												0.015			
GUMS mg/100ml												7			

NOTES:

HYDROPEROXIDES mM/l

CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

C1 - C6 = Light to Dark Fuel Color: C =

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection: P = Pass: F = Fail

DATE: 24 MAR 98 W =Within Allowable Requirement; O = Outside Allowable Requirement UDRI TECH: J. DUES UDRI ENG: B. WILT

OT = **Material Tested Beyond Temperature Range**

N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration UDRI P.I. ENG: D.H. KALT

150

600

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

A.F. AUT. W./MLSE: A. FLETCHER **Between Material Degradation and Fuel Properties Degradation** A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. I.G.1 **MATERIAL / IDENTITY:** NITRILE, MIL-P-83461 (HYDRAULIC) TEST TEMPERATURE (°F) 160 USE: AIRFRAME, FUEL SYSTEM GASKETS, "O" - RINGS **EXPOSURE TIME (DAYS)** 28 TEST ADDITIVE/FUEL: BETZ DEARBORN 8Q462 (Normal & x4 Concentrations)/93POSF 2980 TEST DATE START: 23 JAN 96 JP-8 BASELINE FUEL: 92 POSF 2926 +(JP-8 Additives)

	TEST MA	FERIAL / FUEL 1	EXPOSURE	TES	ST EVALU	ATION CR	RITERIA			EVALUAT	ION OF TI	EST RES	ULTS	
MATERIAL		RESULTS		CONTROL MAT	A	LLOWABLI	E TOLERAN	ICE	COMPAI	RISON TO CO	ONTROL &	(VERALL	1
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUI	REMENT		ALLOWA	ABLE REQUI	REMENTS	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100 x4	JP8	+100	X4
TENSILE (PSI)	413	1145	1192	1532	25%				-73	-25	-22	0	W	W
ELONGATION (%)	78	148	160	159	25%				-51	-7	+1	0	W	W
VOLUME SWELL (%)	15	14	15	N/A		0%		25%	P	P	P	W	\mathbf{W}	W
HARD'S; a) SHORE A (PTS)	68	65	62	74	5 PTS		5 PTS		-6	-9	-12	0	0	0
b) PENCIL														
COMP. SET (avg. 2 spcm's)	10	16	12	N/A				50%	P	P	P	W	W	W
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)													·	
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														

	TEST FUE	L / MATERIAL	EXPOSURE			CONT	ROL FUEL	ı						
FUELS	4 X 7 DA	Y PERIODS (2	28 DAYS)		PRE (NEV	W) VS. POST	(STRESSED)	160°F 7 DAYS		SPECIFICAT	TON RANGE	(SENERAL	
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	P-8	JP-8	3 + 100	JP-8 +	100 x4	FOR	JP-8	OBS	ERVATIO	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	C	C1	С	C1	C	C1			NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	NE	.001	.002	.003	.003		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	.6	NE	4.4	5.2	9.6	12.4		7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.001	NE	0	.001	0	ND			NE	NE	NE
CONDUCTIVITY pS/m @72°F	NE	NE	NE	100	NE	248	NE	912	NE	150	600	NE	NE	NE
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: $\mathbf{C} =$ C1 - C6 = Light to Dark Clear

NE =Not Evaluated; ND = Not Detected; DATE: **Designations:** BD = Below Detection; P = Pass; F = FailWithin Allowable Requirement; W =O = Outside Allowable Requirement UDRI TECH:

J. DUES **Material Tested Beyond Temperature Range** OT = UDRI ENG: B. WILT N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive ConcentrationUDRI P.I. ENG: D.H. KALT

24 MAR 98

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A. FLETCHER A.F. AUT. W./MLSE:

Between Material Degradation and Fuel Properties Degradation A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. **I.G.1 MATERIAL / IDENTITY:** NITRILE, MIL-P-83461 (HYDRAULIC) AIRFRAME, FUEL SYSTEM GASKETS, "O" - RINGS TEST TEMPERATURE (°F) 200 USE: 28 BETZ DEARBORN 8Q462 (Normal & x4 Concentrations)/93POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: TEST DATE START: 24 NOV 94 JP-8 BASELINE FUEL: 93 POSF 2980 +(JP-8 Additives)

	TEST MA	TERIAL / FUEL 1	EXPOSURE	TES	T EVALU	ATION CR	ITERIA			EVALUAT	ION OF TH	EST RES	ULTS	
MATERIAL		RESULTS		CONTROL MAT	A	LLOWABLE	E TOLERAN	ICE	COMPAI	RISON TO CO	ONTROL &	(OVERALI	
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUII	REMENT		ALLOW	ABLE REQUI	REMENTS	EV	ALUATIO)N
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100 x4	JP8	+100	X4
TENSILE (PSI)	245	745	910	1532	25%				-84	-51	-40	0	0	0
ELONGATION (%)	32	100	117	159	25%				-80	-37	-26	0	0	0
VOLUME SWELL (%)	13	14	14	N/A		0%		25%	P	P	P	W	W	W
HARD'S; a) SHORE A (PTS)	79	69	70	74	5 PTS		5 PTS		+5	-5	-4	W	W	W
b) PENCIL														
COMP. SET (avg. 2 spcm's)	30	39	46	N/A				50%	P	P	P	W	W	W
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														

FUELS		L / MATERIAL E AY PERIODS (2			PRE (NEV		ROL FUEL (STRESSED)			SPECIFICAT	TON RANGE	(SENERAL	,
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	P-8	JP-8	3 + 100	JP-8 +	100 x4	FOR	JP-8	OBS	ERVATIO	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	С	C1	С	C1	C	C1			NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.002	.001	.002	.003	.003		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	2	4.8	4.4	2.8	9.6	8.6		7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.004	.037	0	.038	0	.018			NE	NE	NE
CONDUCTIVITY pS/m @72°F	NE	NE	NE	108	39	248	131	912	410	150	600	NE	NE	NE
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail DATE: 23 MAR 98
W = Within Allowable Requirement; O = Outside Allowable Requirement UDRI TECH: J. DUES

OT = Material Tested Beyond Temperature Range
N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration
UDRI P.I. ENG:
D.H. KALT

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

A.F. AUT. W./MLSE:

A.F. AUT. W./POSF

S. A. ANDERSON

TEST PLAN I.D. NO. **I.G.2 MATERIAL / IDENTITY:** NITRILE, MIL-P-25732 (HYDRAULIC) AIRFRAME, FUEL SYSTEM GASKETS, "O" - RINGS TEST TEMPERATURE (°F) 160 USE: BETZ DEARBORN 8Q462 (Normal & x4 Concentrations)/POSF 2980 **EXPOSURE TIME (DAYS)** 28 TEST ADDITIVE/FUEL: TEST DATE START: 26 DEC 95 JP-8 BASELINE FUEL: 93 POSF 2926 +(JP-8 Additives)

	TEST MA	FERIAL / FUEL 1	EXPOSURE	TES	T EVALU	ATION CR	ITERIA			EVALUAT	TON OF TH	EST RES	ULTS	
MATERIAL		RESULTS		CONTROL MAT	A	LLOWABLE	E TOLERAN	ICE	COMPA	RISON TO CO	ONTROL &	(OVERALI	,
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUII	REMENT		ALLOW	ABLE REQUI	REMENTS	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100 x4	JP8	+100	X4
TENSILE (PSI)	1061	921	854	1489	25%				-29	-38	-43	0	0	0
ELONGATION (%)	152	141	132	188	25%				-19	-25	-30	W	W	0
VOLUME SWELL (%)	16	15	14	N/A		0%		25%	P	P	P	W	W	W
HARD'S; a) SHORE A (PTS)	67	67	67	74	5 PTS		5 PTS		-7	-7	-7	0	0	0
b) PENCIL														
COMP. SET (avg. 2 spcm's)	26	26	29	N/A				50%	P	P	P	W	W	W
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)	•													
RUPTURE PRESS. (IN.HG)	<u> </u>													
VISUAL OBSERVATIONS						_				_				

	TEST FUEL	L / MATERIAL	EXPOSURE			CONT	ROL FUEL							
FUELS	4 X 7 DA	Y PERIODS (2	28 DAYS)		PRE (NEV	V) VS. POST	(STRESSED)	160°F 7 DAYS		SPECIFICAT	TON RANGE		GENERAL	,
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	J]	P-8	JP-8	3 + 100	JP-8 +	100 x4	FOR	JP-8	OBS	ERVATIO	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	C	C1	C	C1	C	C1			NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	NE	.001	.002	.003	.003		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	.6	NE	4.4	5.2	9.6	12.4		7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.001	NE	0	.001	0	ND			NE	NE	NE
CONDUCTIVITY pS/m @72°F	NE	NE	NE	100	NE	248	NE	912	NE	150	600	NE	NE	NE
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; DATE: BD = Below Detection; P = Pass; F = Fail23 MAR 98 W =Within Allowable Requirement; O = Outside Allowable Requirement **UDRI TECH:** J. DUES OT =**Material Tested Beyond Temperature Range** UDRI ENG: B. WILT

N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration UDRI P.I. ENG: D.H. KALT

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: A. FLETCHER A.F. AUT. WL/POSF S. A. ANDERSON Between Material Degradation and Fuel Properties Degradation

NITRILE, MIL-P-25732 9HYDRAULIC) TEST PLAN I.D. NO. **I.G.2 MATERIAL / IDENTITY:** AIRFRAME, FUEL SYSTEM GASKETS, "O" - RINGS TEST TEMPERATURE (°F) 200 USE: BETZ DEARBORN 8Q462 (Normal & x4 Concentrations)/93POSF 2980 **EXPOSURE TIME (DAYS)** 28 TEST ADDITIVE/FUEL: TEST DATE START: 9 JUN 94 JP-8 BASELINE FUEL: 93 POSF 2980 +(JP-8 Additives)

	TEST MA	TERIAL / FUEL 1	EXPOSURE	TES	T EVALU	ATION CR	ITERIA			EVALUAT	ION OF TH	EST RES	ULTS	
MATERIAL		RESULTS		CONTROL MAT	A	LLOWABLE	E TOLERAN	ICE	COMPAI	RISON TO CO	ONTROL &	(OVERALI	1
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUII	REMENT		ALLOWA	ABLE REQ UI	REMENTS	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100 x4	JP8	+100	X4
TENSILE (PSI)	743	801	1043	1489	25%				-50	-46	-30	0	0	0
ELONGATION (%)	95	99	115	188	25%				-49	-47	-39	0	0	0
VOLUME SWELL (%)	12	12	12	N/A		0%		25%	P	P	P	W	W	W
HARD'S; a) SHORE A (PTS)	71	71	70	74	5 PTS		5 PTS		-3	-3	-4	W	W	W
b) PENCIL														
COMP. SET (avg. 2 spcm's)	54	63	63	N/A				50%	F	F	F	0	0	0
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														

FUELS		L / MATERIAL E			PRE (NEV		ROL FUEL (STRESSED)			SPECIFICAT	TION RANGE		ENERAL	,
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	J	P-8		3 + 100	JP-8 +	100 x4		JP-8		ERVATIO	
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	С	C1	С	C1	С	C1			NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.002	.001	.002	.003	.003		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	2	4.8	4.4	2.8	9.6	8.6		7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.004	.037	0	.038	0	.018			NE	NE	NE
CONDUCTIVITY pS/m @72°F	15	207	507	108	39	248	131	912	410	150	600	0	W	W
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; DATE: BD = Below Detection; P = Pass; F = Fail24 MAR 98 W =Within Allowable Requirement; O = Outside Allowable Requirement UDRI TECH: J. DUES OT =**Material Tested Beyond Temperature Range UDRI ENG:** B. WILT

N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration UDRI P.I. ENG: D.H. KALT

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: __A. FLETCHER Between Material Degradation and Fuel Properties Degradation A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. I.G.3 **MATERIAL / IDENTITY:** NITRILE, MIL-P-5315 AIRFRAME, FUEL SYSTEM GASKETS, "O" - RINGS TEST TEMPERATURE (°F) 160 USE: BETZ DEARBORN 8Q462 (Normal & x4 Concentrations)/93POSF 2980 **EXPOSURE TIME (DAYS)** 28 TEST ADDITIVE/FUEL: TEST DATE START: 15 FEB 96 JP-8 BASELINE FUEL: 92 POSF 2926 +(JP-8 Additives)

		_							T					
	TEST MA	TERIAL / FUEL	EXPOSURE	TES	T EVALU	ATION CR	RITERIA			EVALUAT	ION OF T	EST RES	ULTS	
MATERIAL		RESULTS		CONTROL MAT	A	LLOWABLE	E TOLERAN	ICE	COMPA	RISON TO CO	ONTROL &	(OVERALI	,
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUI	REMENT		ALLOW	ABLE REQUI	REMENTS	EV	ALUATI(ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100 x4	JP8	+100	X4
TENSILE (PSI)	1009	1528	1592	1783	25%				-43	-14	-11	0	W	W
ELONGATION (%)	199	199	202	309	25%				-36	-36	-35	0	W	W
VOLUME SWELL (%)	16	17	17	N/A		0%		25%	P	P	P	W	W	W
HARD'S; a) SHORE A (PTS)	57	65	65	68	5 PTS		5 PTS		-11	-3	-3	0	W	W
b) PENCIL														
COMP. SET (avg. 2 spcm's)	9	12	6	N/A				50%	P	P	P	W	W	W
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														

FUELC		L / MATERIAL 1 Y PERIODS (2			DDE (NEV		ROL FUEL	160°F 7 DAYS		SDECIEICAT	TION RANGE		ENERAL	
FUELS PROPERTY TESTS*	JP-8	JP-8+100	JP8+100 (X4)	л	P-8		(5 TRESSED) 5 + 100	JP-8 +	100 x4		JP-8	1	FENEKAL ERVATIO	
TROPERTY TESTS	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	С	C1	С	C1	С	C1			NE	NE	NE
ACID NO. mgKOH/gm	NE	.004	.004	.001	NE	.001	.002	.003	.003		0.015	NE	W	W
GUMS mg/100ml	NE	4.4	41.4	.6	NE	4.4	5.2	9.6	12.4		7	NE	W	0
HYDROPEROXIDES mM/l	NE	0	0	.001	NE	0	.01	0	ND			NE	W	W
CONDUCTIVITY pS/m @72°F	15	400	662	100	NE	248	NE	912	NE	150	600	0	W	NSR
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; DATE: BD = Below Detection; P = Pass; F = Fail24 MAR 98 W =Within Allowable Requirement; O = Outside Allowable Requirement **UDRI TECH:** J. DUES

OT =**Material Tested Beyond Temperature Range** UDRI ENG: B. WILT N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive ConcentrationUDRI P.I. ENG: D.H. KALT

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: __A. FLETCHER

A.F. AUT. WL/POSF S. A. ANDERSON Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. **I.G.3 MATERIAL / IDENTITY: NITRILE MIL-P-5315** AIRFRAME, FUEL SYSTEM GASKETS, "O" - RINGS TEST TEMPERATURE (°F) 180 USE: 28 BETZ DEARBORN 8Q462 (Normal & x4 Concentrations)/POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: TEST DATE START: 14 MAR 96 JP-8 BASELINE FUEL: 93 POSF 2926 +(JP-8 Additives)

	mr.am > 5.4		nrin ogrann n											
	TEST MA	TERIAL / FUEL	EXPOSURE	TES	T EVALU	ATION CR	TTERIA			EVALUAT	ION OF TH	EST RES	ULTS	
MATERIAL		RESULTS		CONTROL MAT	A	LLOWABLE	E TOLERAN	ICE	COMPA	RISON TO CO	ONTROL &	(OVERALI	,
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUII	REMENT		ALLOW	ABLE REQUI	REMENTS	EV	ALUATI(ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100 x4	JP8	+100	X4
TENSILE (PSI)	1163	1093	1320	1712	25%				-32	-36	-23	OT	OT	W
ELONGATION (%)	232	222	187	264	25%				-12	-16	-29	W	W	OT
VOLUME SWELL (%)	18	16	17	N/A		0%		25%	P	P	P	W	W	W
HARD'S; a) SHORE A (PTS)	55	56	62	66	5 PTS		5 PTS		-11	-10	-4	OT	OT	W
b) PENCIL														
COMP. SET (avg. 2 spcm's)	19	24	25	N/A				50%	P	P	P	W	W	W
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														

FUELS		L / MATERIAL 1 AY PERIODS (2			PRE (NEV		ROL FUEL (STRESSED)			SPECIFICAT	TON RANGE		GENERAL	<u>, </u>
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	JP-8 PRE POST		S + 100	JP-8 + 1	100 x4	FOR	JP-8	OBS	ERVATIO	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	C1	C1	C1	С	C1	С	C1	С	C1			W	W	W
ACID NO. mgKOH/gm	.006	.003	.004	.001	.003	.001	.003	.003	.007		0.015	W	W	W
GUMS mg/100ml	3.2	5.4	12.4	.6	6.0	4.4	4.0	9.6	8.4		7	W	W	0
HYDROPEROXIDES mM/l	.37	0	0	.001	ND	0	.022	0	.00			О	W	W
CONDUCTIVITY pS/m @72°F	149	376	604	100	NE	248	NE	912	NE	150	600	W	W	NSR
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; DATE: BD = Below Detection; P = Pass; F = Fail23 MAR 98 W =Within Allowable Requirement; O = Outside Allowable Requirement **UDRI TECH:** J. DUES

OT =**Material Tested Beyond Temperature Range UDRI ENG:** B. WILT N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration UDRI P.I. ENG: D.H. KALT

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: __A. FLETCHER

Between Material Degradation and Fuel Properties Degradation A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. **I.G.3 MATERIAL / IDENTITY:** NITRILE, MIL-P-5315 AIRFRAME, FUEL SYSTEM GASKETS, "O" - RINGS TEST TEMPERATURE (°F) 200 USE: 28 BETZ DEARBORN 8Q462 (Normal & x4 Concentrations)/93POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: TEST DATE START: 21 NOV 94 JP-8 BASELINE FUEL: 93 POSF 2980 +(JP-8 Additives)

	TEST MA	FERIAL / FUEL 1	EXPOSURE	TES	T EVALU	ATION CR	ITERIA			EVALUAT	TON OF T	EST RES	ULTS	
MATERIAL		RESULTS		CONTROL MAT	A	LLOWABLE	E TOLERAN	ICE	COMPA	RISON TO CO	ONTROL &	(OVERALI	,
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUII	REMENT		ALLOW.	ABLE REQUI	REMENTS	EV	ALUATI(ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100 x4	JP8	+100	X4
TENSILE (PSI)	174	991	1211	1970	25%				-91	-50	-39	OT	OT	OT
ELONGATION (%)	34	138	147	265	25%				-87	-48	-45	OT	OT	OT
VOLUME SWELL (%)	16	17	18	N/A		0%		25%	P	P	P	W	W	W
HARD'S; a) SHORE A (PTS)	76	63	63	69	5 PTS		5 PTS		+7	-6	-6	OT	OT	OT
b) PENCIL														
COMP. SET (avg. 2 spcm's)	37	41	40	N/A				50%	P	P	P	W	W	W
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														

	TEST FUE	L / MATERIAL	EXPOSURE			CONT	ROL FUEL	ı						
FUELS	4 X 7 DA	Y PERIODS (2	28 DAYS)		PRE (NEV	W) VS. POST	(STRESSED)	200°F 7 DAYS		SPECIFICAT	TION RANGE	(SENERAL	,
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	J]	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR	JP-8	OBS	ERVATIO	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	C	C1	С	C1	C	C1			NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.002	.001	.002	.003	.003		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	2	4.8	4.4	2.8	9.6	8.6		7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.004	.037	0	.038	0	.018			NE	NE	NE
CONDUCTIVITY pS/m @72°F	NE	NE	NE	108	39	248	131	912	410	150	600	NE	NE	NE
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail DATE: 23 MAR 98
W = Within Allowable Requirement; O = Outside Allowable Requirement UDRI TECH: J. DUES_

W = Within Allowable Requirement; O = Outside Allowable Requirement

OT = Material Tested Beyond Temperature Range

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

UDRI TECH:

J. DUES

B. WILT

UDRI P.I. ENG:

D.H. KALT

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. **I.G.3 MATERIAL / IDENTITY:** NITRILE, MIL-P-5315 TEST TEMPERATURE (°F) 325 USE: AIRFRAME, FUEL SYSTEM GASKETS, "O"-RINGS 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **TEST ADDITIVE/FUEL: EXPOSURE TIME (DAYS)** TEST DATE START: 16 NOV '94 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

	TEST MAT	TERIAL / FUEL	EXPOSURE		TEST	EVALUA	TION CRIT	TERIA		EVAI	LUATIO	N OF TE	ST R	ESULT	ΓS
MATERIAL		RESULTS		CONTR	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO C	ONTROL &	(OVERALI	Ē
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIR	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	VALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	NT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	132	(Broke)	111	19	70	25%				-93	-100	-94	OT	OT	ОТ
ELONGATION (%)	38	(Broke)	23		65	25%				-87	-100	-92	OT	OT	OT
VOLUME SWELL (%)	19	15	15	N	/A		0%		25%	P	P	P	\mathbf{W}	\mathbf{W}	\mathbf{W}
HARD'S; a) SHORE A (PTS)	70	82	75	6	19	5 PTS		5 PTS		+1	+13	+6	W	OT	OT
b) PENCIL															
COMP. SET (avg. 2 spcm's)	170	162	147	N	/A				50%	F	F	F	OT	OT	OT
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST FUEL	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	W) VS. POST (STRESSED) °	F 7 DAYS		SPECI	FICATION	RANGE		GENERAI	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	.II.	2-8	.IP-8	+ 100	.IP-8 +	100 x4	-	FOR JP-8		OBS	SERVATION	ONS
TROTERTT TESTS	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	TORUL 0	MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C2	C2	С	C2	С	C2	С	C2				W	W	W
ACID NO. mgKOH/gm	.006	.001	.006	.001	.007	.001	.006	.003	.008			0.015	W	W	W
GUMS mg/100ml	4.2	7.6	15.8	2	3	4.4	3.4	9.6	12.2			7	W	0	О
HYDROPEROXIDES mM/l	.016	NE	.011	.004	.017	0	.015	0	.008				0	NE	О
CONDUCTIVITY pS/m @72°F	10.75	99	403	108	123	248	141	912	555	150		600	W	W	W
VISUAL OBSERVATIONS															

NOTES:

Fuel Color: C = Clear C1 - C6 = Light to Dark

W = Within Allowable Requirement; O = Outside Allowable Requirement OT = Material Tested Beyond Temperature Range

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

DATE: 24 MAR 98
UDRI TECH: J. DUES
UDRI ENG: B. WILT
UDRI P.I. ENG: D.H. KALT
A.F. AUT. W/MLSE: A. FLETCHER
A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. **I.G.4 MATERIAL / IDENTITY:** NITRILE, AMS 7271 / MS 9201 AIRFRAME, FUEL SYSTEM GASKETS, "O" - RINGS TEST TEMPERATURE (°F) 160 USE: BETZ DEARBORN 8Q462 (Normal & x4 Concentrations)/POSF 2980 **EXPOSURE TIME (DAYS)** 28 TEST ADDITIVE/FUEL: TEST DATE START: 20 SEP 95 JP-8 BASELINE FUEL: 92 POSF 2926 +(JP-8 Additives)

	TEST MA	TERIAL / FUEL 1	EXPOSURE	TES	T EVALU	ATION CR	ITERIA			EVALUAT	ION OF TH	EST RES	ULTS	
MATERIAL		RESULTS		CONTROL MAT	A	LLOWABLE	TOLERAN	CE	COMPA	RISON TO CO	ONTROL &	(OVERALI	-
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUII	REMENT		ALLOW	ABLE REQUI	REMENTS	EV	ALUATIO)N
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100 x4	JP8	+100	X4
TENSILE (PSI)	1170	1085	1141	1665	40%				-30	-35	-31	W	W	W
ELONGATION (%)	226	214	229	255	20%				0	-5	-2	W	W	W
VOLUME SWELL (%)	36	36	39	N/A		0%		40%	P	P	P	W	W	W
HARD'S; a) SHORE A (PTS)	58	59	58	69	12Pts		12Pts		-11	-10	-11	W	W	W
b) PENCIL														
COMP. SET (avg. 2 spcm's)	0	1	0	N/A				40%	P	P	P	W	W	W
LAP SHEAR (PSI)														1
COHESION (%)														
TAPE ADHESION (P/F)														ł
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														ł
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														

FUELS		L / MATERIAL 1 Y PERIODS (2			PRE (NEV		ROL FUEL (STRESSED)			SPECIFICAT	TON RANGE	(GENERAL	
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	JP-8 PRE POST		3 + 100	JP-8 + 1	100 x4	FOR	JP-8	OBS	ERVATIO	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	C1	C1	C1	С	C1	С	C1	С	C1			W	W	W
ACID NO. mgKOH/gm	.018	.021	.025	.001	NE	.001	.002	.003	.003		0.015	О	0	0
GUMS mg/100ml	12.6	22.8	27.4	.6	NE	4.4	5.2	9.6	12.4		7	О	0	0
HYDROPEROXIDES mM/l	.02	.01	.005	.001	NE	0	.01	0	ND			W	W	W
CONDUCTIVITY pS/m @72°F	50	226	544	100	NE	248	NE	912	NE	150	600	О	W	W
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail DATE: 24 MAR 98
W = Within Allowable Requirement; O = Outside Allowable Requirement UDRI TECH: J. DUES

OT = Material Tested Beyond Temperature Range
N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration
UDRI P.J. ENG:
UDRI P.J. ENG:
UDRI P.J. ENG:
D.H. KALT
D.H. KA

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

A.F. AUT. W./MLSE:

A.F. AUT. WL/POSF

TEST PLAN I.D. NO. **I.G.4 MATERIAL / IDENTITY:** NITRILE, AMS 7271 / MS 9201 TEST TEMPERATURE (°F) AIRFRAME, FUEL SYSTEM GASKETS, "O" - RINGS 200 USE: 28 BETZ DEARBORN 8Q462 (Normal & x4 Concentrations)/POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: TEST DATE START: 15 FEB 95 JP-8 BASELINE FUEL: 92 POSF 2980 +(JP-8 Additives)

	TEST MA	TERIAL / FUEL 1	EXPOSURE	TES	T EVALU	ATION CR	ITERIA			EVALUAT	ION OF TI	EST RES	ULTS	
MATERIAL		RESULTS		CONTROL MAT	A	LLOWABLE	E TOLERAN	ICE	COMPA	RISON TO CO	ONTROL &	(OVERALI	,
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUII	REMENT		ALLOW	ABLE REQUI	REMENTS	EV	ALUATI(ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100 x4	JP8	+100	X4
TENSILE (PSI)	563	355	507	1577	40%				-64	-77	-68	OT	OT	OT
ELONGATION (%)	231	185	207	231	20%				0	-20	-10	W	W	W
VOLUME SWELL (%)	50	49	49	N/A		0%		40%	F	F	F	OT	OT	OT
HARD'S; a) SHORE A (PTS)	43	42	46	69	12Pts		12Pts		-26	-27	-23	OT	OT	OT
b) PENCIL														
COMP. SET (avg. 2 spcm's)	54	34	37	N/A				40%	F	P	P	OT	W	W
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														

FUELS	-	L / MATERIAL 1 Y PERIODS (2			PRE (NEV		ROL FUEL (STRESSED)			SPECIFICAT	TON RANGE	(GENERAL	,
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	P-8	JP-8	S + 100	JP-8 +	100 x4	FOR	JP-8	OBS	ERVATIO	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	С	C1	С	C1	С	C1			NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.001	.001	.002	.003	.003		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	.6	.8	4.4	2.8	9.6	8.6		7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.001	.002	0	.038	0	.018			NE	NE	NE
CONDUCTIVITY pS/m @72°F	NE	NE	NE	100	66	248	131	912	410	150	600	NE	NE	NE
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; DATE: BD = Below Detection; P = Pass; F = Fail

W =Within Allowable Requirement; O = Outside Allowable Requirement **UDRI TECH:** J. DUES OT =**Material Tested Beyond Temperature Range** UDRI ENG: B. WILT N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration UDRI P.I. ENG: D.H. KALT A.F. AUT. W./MLSE: __A. FLETCHER

23 MAR 98

A.F. AUT. WL/POSF S. A. ANDERSON

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. I.G.5 / II.G.2 MATERIAL / IDENTI TY: FLUOROSILICONE, MIL-R-25988 TEST TEMPERATURE (°F) AIRFRAME, FUEL SYSTEM GASKETS, "O" - RINGS 200 USE: 28 BETZ DEARBORN 8Q462 (Normal & x4 Concentrations)/93POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: TEST DATE START: 9 JUN 94 JP-8 BASELINE FUEL: 93 POSF 2980 +(JP-8 Additives)

	TEST MA	TERIAL / FUEL 1	EXPOSURE	TES	T EVALU	ATION CR	ITERIA			EVALUAT	ION OF TH	EST RES	ULTS	
MATERIAL		RESULTS		CONTROL MAT	A	LLOWABLE	E TOLERAN	ICE	COMPA	RISON TO CO	ONTROL &	(OVERALI	,
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT			REMENT		ALLOW	ABLE REQUI	REMENTS	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100 x4	JP8	+100	X4
TENSILE (PSI)	856	857	852	984	45%				-13%	-13%	-13%	W	W	W
ELONGATION (%)	199	201	194	195	35%				+2%	+3%	-1%	W	W	W
VOLUME SWELL (%)	9	9	9	N/A		0%		25%	P	P	P	W	W	W
HARD'S; a) SHORE A (PTS)	63	63	63	69	20Pts				-2	-2	-2	W	W	W
b) PENCIL														
COMP. SET (avg. 2 spcm's)	6	9	10	N/A				30%	P	P	P	W	W	W
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														

FUELS		L / MATERIAL 1 Y PERIODS (2			PRE (NEV		ROL FUEL			SPECIFICAT	TION RANGE	(SENERAL	
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	J]	JP-8 PRE POST		3 + 100	JP-8 +	100 x4	FOR			ERVATIO	
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	C1	C1	C1	С	C1	C	C1	C	C1			W	W	W
ACID NO. mgKOH/gm	.002	.002	.003	.001	.002	.001	.002	.003	.003		0.015	W	W	W
GUMS mg/100ml	3.4	5.2	14.2	2	4.8	4.4	2.8	9.6	8.6		7	W	W	W
HYDROPEROXIDES mM/l	.09	.03	0	.004	.037	0	.038	0	.018			О	W	W
CONDUCTIVITY pS/m @72°F	42	231	399	108	39	248	131	912	410	150	600	W	W	W
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; DATE: BD = Below Detection; P = Pass; F = Fail23 MAR 98 W =Within Allowable Requirement; O = Outside Allowable Requirement **UDRI TECH:** J. DUES **UDRI ENG:** B. WILT

OT =**Material Tested Beyond Temperature Range**

N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration UDRI P.I. ENG: D.H. KALT * Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: __A. FLETCHER Between Material Degradation and Fuel Properties Degradation A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. I.G.6 / II.G.9 **MATERIAL / IDENTITY:** FLUOROCARBON, MIL-R-83248 TEST TEMPERATURE (°F) AIRFRAME, FUEL SYSTEM GASKETS, "O" - RINGS 200 USE: 28 BETZ DEARBORN 8Q462 (Normal & x4 Concentrations)/POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: TEST DATE START: 9 JUN 94 JP-8 BASELINE FUEL: 93 POSF 2980 +(JP-8 Additives)

	TEST MA	TERIAL / FUEL	EXPOSURE	TES	T EVALU	ATION CR	RITERIA			EVALUAT	TON OF TI	EST RES	ULTS	
MATERIAL		RESULTS		CONTROL MAT	A	LLOWABLI	E TOLERAN	ICE	COMPA	RISON TO CO	ONTROL &	(OVERALI	
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUII	REMENT		ALLOW	ABLE REQUI	REMENTS	EV	VALUATI(ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100 x4	JP8	+100	X4
TENSILE (PSI)	1873	1749	1726	1823	20%				+3%	-4%	-5%	W	W	W
ELONGATION (%)	228	215	196	193	20%				+18%	+11%	+2%	W	W	W
VOLUME SWELL (%)	4	4	4	N/A		0%		10%	P	P	P	W	W	W
HARD'S; a) SHORE A (PTS)	74	74	73	75	5Pts		5Pts		-1	-1	-2	W	W	W
b) PENCIL														
COMP. SET (avg. 2 spcm's)	6	6	10	N/A				60%	P	P	P	W	W	W
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														

FUELS		L / MATERIAL E			PRE (NEV		ROL FUEL			SPECIFICAT	TON RANGE		ENERAL	
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	JP-8 PRE POST		3 + 100	JP-8 +	100 x4	FOR			ERVATIO	
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C	C1	С	C1	С	C1	С	C1			W	W	W
ACID NO. mgKOH/gm	.002	.002	.003	.001	.002	.001	.002	.003	.003		0.015	W	W	W
GUMS mg/100ml	5.6	5.8	11.6	2	4.8	4.4	2.8	9.6	8.6		7	W	W	NSR
HYDROPEROXIDES mM/l	.031	0	.008	.004	.037	0	.038	0	.018			W	W	W
CONDUCTIVITY pS/m @72°F	25	332	491	108	39	248	131	912	410	150	600	0	W	W
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; DATE: BD = Below Detection; P = Pass; F = Fail23 MAR 98 W =Within Allowable Requirement; O = Outside Allowable Requirement **UDRI TECH:** J. DUES OT =**Material Tested Beyond Temperature Range UDRI ENG:** B. WILT

N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

UDRI P.I. ENG: D.H. KALT * Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: A. FLETCHER A.F. AUT. WL/POSF S. A. ANDERSON Between Material Degradation and Fuel Properties Degradation

I.G.7 / II.G.3 TEST PLAN I.D. NO. **MATERIAL / IDENTITY:** FLUOROCARBON, MIL-R-83485 TEST TEMPERATURE (°F) AIRFRAME, FUEL SYSTEM GASKETS, "O" - RINGS 200 USE: 28 BETZ DEARBORN 8Q462 (Normal & x4 Concentrations)/93POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: TEST DATE START: 9 JUN 94 JP-8 BASELINE FUEL: 93 POSF 2980 +(JP-8 Additives)

	TEST MA	FERIAL / FUEL 1	EXPOSURE	TES	T EVALU	ATION CR	ITERIA			EVALUAT	ION OF TH	EST RES	ULTS	
MATERIAL		RESULTS		CONTROL MAT	A	LLOWABLE	E TOLERAN	ICE	COMPA	RISON TO CO	ONTROL &	(OVERALI	,
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT			REMENT		ALLOW	ABLE REQUI	REMENTS	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100 x4	JP8	+100	X4
TENSILE (PSI)	1456	1446	1410	1644	20%				-11%	-12%	-14%	W	W	W
ELONGATION (%)	181	179	178	193	20%				-6%	-7%	-8%	W	W	W
VOLUME SWELL (%)	4	4	5	N/A		0%		10%	P	P	P	W	W	W
HARD'S; a) SHORE A (PTS)	74	74	74	76	5Pts		5 PTS		-2	-2	-2	W	W	W
b) PENCIL														
COMP. SET (avg. 2 spcm's)	9	10	9	N/A				60%	P	P	P	W	W	W
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														

FUELS		L / MATERIAL E			PRE (NEV		ROL FUEL			SPECIFICAT	TON RANGE	(ENERAL	
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	J	JP-8 PRE POST		3 + 100	JP-8 +	100 x4	FOR			ERVATIO	
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	C	C1	С	C1	C	C1			NE	NE	NE
ACID NO. mgKOH/gm	.003	.003	.004	.001	.002	.001	.002	.003	.003		0.015	W	W	W
GUMS mg/100ml	3.4	5.8	12.8	2	4.8	4.4	2.8	9.6	8.6		7	W	W	0
HYDROPEROXIDES mM/l	.031	.017	NE	.004	.037	0	.038	0	.018			0	W	NE
CONDUCTIVITY pS/m @72°F	448	779	852	108	39	248	131	912	410	150	600	W	0	0
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; DATE: BD = Below Detection; P = Pass; F = Fail23 MAR 98 W =Within Allowable Requirement; O = Outside Allowable Requirement UDRI TECH: J. DUES OT =**Material Tested Beyond Temperature Range UDRI ENG:** B. WILT

N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

UDRI P.I. ENG: D.H. KALT * Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: A. FLETCHER A.F. AUT. WL/POSF S. A. ANDERSON

Between Material Degradation and Fuel Properties Degradation

PERFLUOROELASTOMER, AMS 7257A TEST PLAN I.D. NO. I.G.8 / II.G.4 **MATERIAL / IDENTITY:** TEST TEMPERATURE (°F) AIRFRAME, FUEL SYSTEM GASKETS, "O" - RINGS 200 USE: 28 BETZ DEARBORN 8Q462 (Normal & x4 Concentrations)/93POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: TEST DATE START: 26 OCT 94 JP-8 BASELINE FUEL: 93 POSF 2980 +(JP-8 Additives)

	TEST MA	FERIAL / FUEL 1	EXPOSURE	TES	T EVALU	ATION CR	RITERIA			EVALUAT	ION OF TI	EST RES	ULTS	
MATERIAL		RESULTS		CONTROL MAT	A	LLOWABLI	E TOLERAN	ICE	COMPA	RISON TO CO	ONTROL &	(OVERALI	
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUI	REMENT		ALLOW	ABLE REQUI	REMENTS	EV	'ALUATIO)N
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100 x4	JP8	+100	X4
TENSILE (PSI)	2105	2060	2029	2313	20%				-9%	-11%	-12%	W	W	W
ELONGATION (%)	114	115	105	110	15%				+4%	+5%	-5%	W	W	W
VOLUME SWELL (%)	2	2	2	N/A		0%		5%	P	P	P	W	W	W
HARD'S; a) SHORE A (PTS)	80	80	81	84	5 Pts		5 Pts		-4	-4	-3	W	W	W
b) PENCIL														
COMP. SET (avg. 2 spcm's)	No Test	No Test	No Test	N/A				60%	NE	NE	NE	NE	NE	NE
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														

FUELS		L / MATERIAL 1 Y PERIODS (2			PRE (NEV		ROL FUEL (STRESSED) 2			SPECIFICAT	TON RANGE	(GENERAL	
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	JP-8 PRE POST		3 + 100	JP-8 +	100 x4	FOR	JP-8	OBS	ERVATIO	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	С	C1	C	C1	C	C1			NE	NE	NE
ACID NO. mgKOH/gm	.002	.003	.005	.001	.002	.001	.002	.003	.003		0.015	W	W	W
GUMS mg/100ml	1.8	2.6	5.2	2	4.8	4.4	2.8	9.6	8.6		7	W	W	W
HYDROPEROXIDES mM/l	.014	.009	NE	.004	.037	0	.038	0	.018			О	0	NE
CONDUCTIVITY pS/m @72°F	457	644	855	108	39	248	131	912	410	150	600	W	0	0
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; DATE: BD = Below Detection; P = Pass; F = Fail24 MAR 98 W =Within Allowable Requirement; O = Outside Allowable Requirement **UDRI TECH:**

J. DUES OT =**Material Tested Beyond Temperature Range UDRI ENG:** B. WILT N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration UDRI P.I. ENG: D.H. KALT

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: A. FLETCHER

A.F. AUT. WL/POSF S. A. ANDERSON Between Material Degradation and Fuel Properties Degradation

NITRILE, TYPE S TEST PLAN I.D. NO. I.G.9 **MATERIAL / IDENTITY:** AIRFRAME, FUEL SYSTEM GASKETS, "O" - RINGS TEST TEMPERATURE (°F) 160 USE: BETZ DEARBORN 8Q462 (Normal & x4 Concentrations)/POSF 2980 **EXPOSURE TIME (DAYS)** 28 TEST ADDITIVE/FUEL: TEST DATE START: 25 JAN 96 JP-8 BASELINE FUEL: 93 POSF 2926 +(JP-8 Additives)

	TEST MA	TERIAL / FUEL	EXPOSURE	TES	T EVALU	ATION CR	ITERIA			EVALUAT	ION OF TI	EST RES	ULTS	
MATERIAL		RESULTS		CONTROL MAT	A	LLOWABLI	E TOLERAN	ICE	COMPA	RISON TO CO	ONTROL &	(OVERALI	
PROPERTY TESTS	JP-8	JP-8+100	JP8+100 (X4)	MEASURED AT		REQUI	REMENT		ALLOW	ABLE REQUI	REMENTS	EV	'ALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100 x4	JP8	+100	X4
TENSILE (PSI)	1926	1704	1847	2138	25%				-10	-20	-14	W	W	W
ELONGATION (%)	256	209	229	254	25%				+1	-18	-10	W	W	W
VOLUME SWELL (%)	7	6	5	N/A		0%		25%	P	P	P	W	W	W
HARD'S; a) SHORE A (PTS)	63	63	64	71	5 Pts		5 Pts		-8	-8	-7	0	W	W
b) PENCIL														
COMP. SET (avg. 2 spcm's)	9	12	9	N/A				50%	P	P	P	W	W	W
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														

FUELS	-	L / MATERIAL 1 Y PERIODS (2			PRE (NEV		ROL FUEL (STRESSED)			SPECIFICAT	TON RANGE	(GENERAL	4
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	J]	JP-8 PRE POST		3 + 100	JP-8 + 1	100 x4	FOR	JP-8	OBS	ERVATIO	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	С	C1	С	C1	С	C1			NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	NE	.001	.002	.003	.003		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	.6	NE	4.4	5.2	9.6	12.4		7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.001	NE	0	.01	0	ND			NE	NE	NE
CONDUCTIVITY pS/m @72°F	NE	NE	NE	100	NE	248	NE	912	NE	150	600	NE	NE	NE
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; DATE: BD = Below Detection; P = Pass; F = Fail24 MAR 98 W =Within Allowable Requirement; O = Outside Allowable Requirement **UDRI TECH:** J. DUES OT =**Material Tested Beyond Temperature Range** UDRI ENG: B. WILT

N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration UDRI P.I. ENG: D.H. KALT

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: __A. FLETCHER Between Material Degradation and Fuel Properties Degradation A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. **I.G.9 MATERIAL / IDENTITY:** NITRILE, TYPE S TEST TEMPERATURE (°F) 200 USE: AIRFRAME, FUEL SYSTEM, GASKETS, "O" RING 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL:** TEST DATE START: 16 FEB '95 92 POSF 2980 + (JP-8 Additives) JP-8 BASELINE FUEL:

	TEST MAT	TERIAL / FUEL	EXPOSURE		TEST	EVALUA	TION CRIT	ERIA		EVAL	LUATIO	N OF TE	ST R	ESUL T	ΓS
MATERIAL		RESULTS		CONTR	OL MAT	AI	LLOWABLE	TOLERAN	CE	COMPARI	ISON TO CO	ONTROL &		OVERALI	
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIR	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	415	1430	1607	21	38	25%				-81	-33	-25	OT	OT	W
ELONGATION (%)	49	119	148	25	54	25				-81	-53	-42	OT	OT	OT
VOLUME SWELL (%)	5	3	4	N.	/ A		0		25	P	P	P	\mathbf{W}	W	\mathbf{W}
HARD'S; a) SHORE A (PTS)	79	74	72	7	1	5		5		+8	+3	+1	OT	\mathbf{W}	\mathbf{W}
b) PENCIL															
COMP. SET (avg. 2 spcm's)	44	38	44	N.	/ A				50	P	P	P	\mathbf{W}	W	W
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEW)	VS. POST (ST	RESSED) 200	°F 7 DAYS		SPECI	FICATION	RANGE		GENERAI	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JF	P-8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-8		OBS	SERVATION	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	C	C1	C	C1	С	C1				NE	NE	NE
ACID NO. mgKOH/gm	.004	.004	.005	.001	.002	.001	.002	.003	.003			0.015	\mathbf{W}	W	W
GUMS mg/100ml	4	5.2	12.4	2	4.8	4.4	2.8	9.6	8.6			7	\mathbf{W}	\mathbf{W}	О
HYDROPEROXIDES mM/l	.039	NE	.012	.004	.037	0	.032	0	.018				О	NE	NE
CONDUCTIVITY pS/m @72°F	448	950	960	108	39	248	131	912	410	150		600	W	0	О

NOTES:

VISUAL OBSERVATIONS

 $\mathbf{C} =$ C1 - C6 = Light to Dark Fuel Color: Clear

Not Evaluated; ND = Not Detected; **Designations:** NE =BD = Below Detection; P = Pass; F = Fail

Within Allowable Requirement; W =O = Outside Allowable Requirement OT =**Material Tested Beyond Temperature Range**

Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration N/A =

UDRI P.I. ENG: D.H. KALT * Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: __A.FLETCHER Between Material Degradation and Fuel Properties Degradation A.F. AUT. WL/POSF S. A. ANDERSON

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

DATE:

UDRI TECH:

UDRI ENG:

23 MAR 98

B. WILT

FUEL / MATERIAL COMPATIBILITY TEST RESULTS TEST PLAN I.D. NO. I.G.10/II.G.1 **MATERIAL / IDENTITY:** FLUOROSILICONE, MIL-R-25988 TEST TEMPERATURE (°F) 200 USE: ENGINE / AIRFRAME, FUEL SYSTEMS, GASKET / "O" RING Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 28 **TEST ADDITIVE/FUEL: EXPOSURE TIME (DAYS)** TEST DATE START: NTP 93 POSF 2980 + (JP-8 Additives) JP-8 BASELINE FUEL:

	TEST MAT	TERIAL / FUEL	EXPOSURE		TEST	EVALUA	TION CRIT	TERIA		EVAL	UAT	TON (OF TES	ST R	ESUL'	ΓS
MATERIAL		RESULTS		CONTRO	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPARI	SON TO	O CONTI	ROL &	(OVERAL	$\overline{\mathbf{L}}$
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIE	REMENT		ALLOWAI	BLE RE	QUIREM	MENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	Т ТЕМР	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8 +1	100 J	P-8+100x4	JP8	+100	X4
TENSILE (PSI)																
ELONGATION (%)																
VOLUME SWELL (%)																
HARD'S; a) SHORE A (PTS)																
b) PENCIL																
COMP. SET (avg. 2 spcm's)																
LAP SHEAR (PSI)																
COHESION (%)																
TAPE ADHESION (P/F)																
PEEL STRENGTH (LB/IN)																
LAMINAR SHEAR (PSI)																
RESISTIVITY (OHM-CM)																
TORQUE (INCH -LBS.)																
RUPTURE PRESS. (IN.HG)																
VISUAL OBSERVATIONS																
		/ 1 / 1 / PEDIA	EVENOGUEE			"				<u>'</u>						
	IESI FUEI	L / MATERIAL	EXPOSURE			CONTR	OL FUEL									
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NE	W) VS. POST (STRESSED) °	F 7 DAYS		SPECII	FICATI	ION RAN	IGE	(GENERA	.L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JP	-8	JP-8	+ 100	JP-8 +	100 x4		FOR J	IP-8		OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MA	AX	JP8	+100	X4
COLOR (7 DAYS)																
ACID NO. mgKOH/gm												0.0)15			
GUMS mg/100ml												7	7			
HYDROPEROXIDES mM/l																
CONDUCTIVITY pS/m @72°F										150		60	00			
VISUAL OBSERVATIONS																

NOTES:

Fuel Color: C = Clear C1 - C6 = Light to Dark

W = Within Allowable Requirement; O = Outside Allowable Requirement OT = Material Tested Beyond Temperature Range

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists
Between Material Degradation and Fuel Properties Degradation

 DATE:
 23 MAR 98

 UDRITECH:
 J. DUES

 UDRI ENG:
 B. WILT

 UDRI P.I. ENG:
 D.H. KALT

 A.F. AUT. W./MLSE:
 A. FLETCHER

 A.F. AUT. WL/POSF
 S. A. ANDERSON

TEST PLAN I.D. NO. I.G.11/II.G.10 MATERIAL / IDENTITY: URETHANE, SEAL TEST TEMPERATURE (°F) 160 **USE:** AIRFRAME / ENGINE, FUEL SYSTEM PUMP WASHER 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL:** 11 OCT '96 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

	TEST MAT	TERIAL / FUEL	EXPOSURE		TEST	EVALUA	TION CRIT	ERIA		EVAI	LIATIO	N OF TE	ST R	ESIILT	rs
MATERIAL		RESULTS		CONTRO	OL MAT	Α1	LOWABLE	TOI FRAN	CF			ONTROL &		OVERAL	
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)		RED AT	Al	REOUIR		CE		BLE REOU			ALUATI	
(AVG. 5 SPECIMENS)	POST	POST	POST		T TEMP	DECREASE	MIN VALUE	INCREASE	MAX	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
<u> </u>									VALUE						
TENSILE (PSI)															
ELONGATION (%)															
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS	P	P	P	J	2	/ P				P	P	P	W	W	W
	TEST FUEL	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 Y 7 DA	Y PERIODS (28 DAVS)		PRE-NEW)	VS. POST (ST	RESSED) 160	°F 7 DAYS		SPECI	FICATION	RANCE		GENERA	г
	.IP-8	JP-8 +100	JP8+100 (X4)	TT					100 4	Sile		KANGE			
PROPERTY TESTS*	POST	POST	POST	PRE	P-8 POST	PRE	+ 100 POST	JP-8 + PRE	100 x4 POST	MIN	FOR JP-8	MAX	JP8	+100	X4
	1031	1031	1031	PKE	POST	PKE	POST	PKE	POST	IVIIIN		WAA	JI 0	+100	Λ4
COLOR (7 DAYS)	C	C	C	C	C1	C	C1	C	C1				\mathbf{W}	\mathbf{W}	\mathbf{W}
ACID NO. mgKOH/gm	NE	NE	NE	.001	.002	.001	.002	.003	.003			0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	2	4.8	4.4	2.8	9.6	8.6			7	NE	NE	NE
HYDROPEROXIDES Mm/l	NE	NE	NE	.004	.037	0	.032	0	.018				NE	NE	NE
CONDUCTIVITY pS/m @72°F	1138	448	811	108	39	248	131	912	410	150		600	0	W	О
VISUAL OBSERVATIONS															

NOTES:

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

W = Within Allowable Requirement; O = Outside Allowable Requirement

OT = Material Tested Beyond Temperature Range

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

A.F. AUT. WL/POSF

S. A. ANDERSON

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

DATE:

UDRI TECH:

UDRI P.I. ENG:

UDRI ENG:

23 MAR 98

J. DUES

B. WILT

D.H. KALT

TEST PLAN I.D. NO. I.G.11 / II.G.10 **MATERIAL / IDENTITY:** URETHANE, SEAL TEST TEMPERATURE (°F) 200 **USE:** AIRFRAME / ENGINE, FUEL SYSTEM PUMP, WASHER 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL:** 2 JULY '96 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

	TEST MAT	TERIAL / FUEL	EXPOSURE		TEST	'EVALUA'	TION CRIT	ERIA		EVAI	LUATIO	ON OF TE	ST R	ESULT	ΓS
MATERIAL		RESULTS		CONTR	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO C	ONTROL &	(OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIR	REMENT		ALLOWA	BLE REQU	IREMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)															
ELONGATION (%)															
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS	F	F	F]	7	/ P				F	F	F	ОТ	OT	OT
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL			ľ					
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEW)	VS. POST (S	FRESSED) 200	°F 7 DAYS		SPECI	FICATION	RANGE		GENERAL	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	.II.	P-8	.IP-8	+ 100	.IP-8 +	100 x4		FOR JP-8	:	OBS	SERVATI	ONS
TROTERTT TESTS	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	TORUT	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	С	C1	С	C1	С	C1				NE	NE	NE
ACID NO. mgKOH/gm	.010	.014	.021	.001	.002	.001	.002	.003	.003			0.015	W	W	0
GUMS mg/100ml	4.4	7.8	16.4	2	4.8	4.4	2.8	9.6	8.6			7	W	0	0
HYDROPEROXIDES mM/l	ND	ND	ND	.004	.037	0	.032	0	.018				W	W	W
CONDUCTIVITY pS/m @72°F	NE	NE	NE	108	39	248	131	912	410	150		600	NE	NE	NE
VISUAL OBSERVATIONS															

NOTES:

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

W = Within Allowable Requirement; O = Outside Allowable Requirement

OT = Material Tested Beyond Temperature Range

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation DATE: 24 MAR 98
UDRI TECH: J. DUES
UDRI ENG: B. WILT
UDRI P.I. ENG: D.H. KALT
A.F. AUT. W./MLSE: A. FLETCHER
A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. I.G.12/II.G.11 **MATERIAL / IDENTITY:** URETHANE, TANG TEST TEMPERATURE (°F) 200 **USE:** AIRFRAME / ENGINE FUEL SYSTEM, PUMP TANG 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL:** 27 AUG '96 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

										•					
	TEST MAT	TERIAL / FUEL	EXPOSURE		TEST	EVALUA	TION CRIT	ERIA		EVAI	LUATIO	ON OF TE	ST R	ESULT	ΓS
MATERIAL		RESULTS		CONTR	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO C	ONTROL &	(OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIR	REMENT		ALLOWA	BLE REQU	IREMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)															
ELONGATION (%)															
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS	P	P	P	J	•	/ P				P	P	P	W	W	W
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEW)	VS. POST (S	TRESSED) 200	0°F 7 DAYS		SPECI	FICATION	RANGE		GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	II.	·-8	JP-8	+ 100	.IP-8 +	100 x4		FOR JP-8	:	OBS	SERVATI	ONS
THOTENT TEOTO	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	C1	C1	C1	С	C1	С	C1	С	C1				W	W	W
ACID NO. mgKOH/gm	.004	.004	.007	.001	.002	.001	.002	.003	.003			0.015	W	W	W
GUMS mg/100ml	2.4	5.4	17.8	2	4.8	4.4	2.8	9.6	8.6			7	W	W	О
HYDROPEROXIDES mM/l	.00	.01	.02	.004	.037	0	.032	0	.018			_	W	W	О
CONDUCTIVITY pS/m @72°F	115	315	546	108	39	248	131	912	410	150		60O	О	W	W
VISUAL OBSERVATIONS					108 39										

NOTES:

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

W = Within Allowable Requirement; O = Outside Allowable Requirement

OT = Material Tested Beyond Temperature Range

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists
Between Material Degradation and Fuel Properties Degradation

DATE: 24 MAR 98
UDRI TECH: J. DUES
UDRI ENG: B. WILT
UDRI P.I. ENG: D.H. KALT
A.F. AUT. W/MLSE: A. FLETCHER
A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. I.G.13/ See I.O.8 data **MATERIAL / IDENTITY:** CORK TEST TEMPERATURE (°F) 200 **USE:** AIRFRAME / FUEL SYSTEM GASKET 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL:** 27 AUG '96 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

	TEST MAT	TERIAL / FUEL	EXPOSURE		TEST	'EVALUA'	TION CRIT	TERIA		EVAI	LUATIO	N OF TE	ST R	ESUL	ΓS
MATERIAL		RESULTS		CONTR	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO C	ONTROL &	(OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIR	REMENT		ALLOWA	BLE REQU	IREMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)															
ELONGATION (%)															
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS	P	P	P			OBSER		OBSER		P	P	P	W	W	W
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEW)	VS. POST (S	TRESSED) 200	0°F 7 DAYS		SPECI	FICATION	RANGE		GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	.II.	P-8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-8		OBS	SERVATI	ONS
7 KO7 EK77 7 E075	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	101101	MAX	JP8	+100	X4
COLOR (7 DAYS)	C1	C1	C1	С	C1	С	C1	С	C1				W	W	W
ACID NO. mgKOH/gm	.005	.005	.007	.001	.001	.001	.002	.003	.003			0.015	W	W	W
GUMS mg/100ml	2.4	17.6	6.6	.6	.8	4.4	2.8	9.6	8.6			7	W	0	W
HYDROPEROXIDES mM/l	.00	.02	.02	.001	.002	0	.032	0	.018				W	W	О
CONDUCTIVITY pS/m @72°F	107	291	539	100	66	248	131	912	410	150		600	0	W	W
VISUAL OBSERVATIONS															

NOTES:

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

W = Within Allowable Requirement; O = Outside Allowable Requirement

OT = Material Tested Beyond Temperature Range

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

A.F. AUT. WL/POSF

S. A. ANDERSON

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

DATE:

UDRI TECH:

UDRI P.I. ENG:

UDRI ENG:

23 MAR 98

J. DUES

B. WILT

D.H. KALT

TEST EVALUATION CRITERIA

TEST PLAN I.D. NO. II.G.1 / I. G.10 **MATERIAL / IDENTITY:** FLUOROSILICONE, MIL-R-25988 TEST TEMPERATURE (°F) 275 USE: AIRFRAME / ENGINE FUEL SYSTEM, GASKET "O" RING 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: 21 DEC '95 92 POSF 2926 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

MATERIAL		RESULTS		CONTR	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	NTROL &	(OVERALI	<u>. </u>
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIR	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	89	BROKE	BROKE	11	87	45%				-93	-100	-100	OT	OT	OT
ELONGATION (%)	17	BROKE	BROKE	18	33	35				-91	-100	-100	OT	OT	OT
VOLUME SWELL (%)	2	-7	-4	N.	/A		0		25	P	F	F	\mathbf{W}	TO	OT
HARD'S; a) SHORE A (PTS)	72	83	76	7	4	20				-2	+9	+2	\mathbf{W}	\mathbf{W}	W
b) PENCIL															
COMP. SET (avg. 2 spcm's)	29	29	29	N.	/ A				30	P	P	P	\mathbf{W}	\mathbf{W}	\mathbf{W}
LAP SHEAR (PSI)														ļ	
COHESION (%)															
TAPE ADHESION (P/F)														ļ	
PEEL STRENGTH (LB/IN)														,	
LAMINAR SHEAR (PSI)														,	
RESISTIVITY (OHM-CM)														,	
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)														,	
VISUAL OBSERVATIONS															
	TEST EILE	L / MATERIAL	EXPOSIDE			CONTIN	OI FUEL			1					
							OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEW) VS. POST (S	TRESSED) 275	5°F 7 DAYS		SPECI	IFICATION I	RANGE	(GENERAI	Ĺ
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JF	P-8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-8		OBS	SERVATIO	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	C	C2	C	C2	C	C2				NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	NE	.003	.03	.003	.02			0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	.6	NE	4.	13	9.6	41.8			7	NE	NE	NE

.22

248

0.0

NE

0

912

0.0

NE

DATE:

UDRI TECH:

NOTES:

HYDROPEROXIDES mM/l

CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

Fuel Color: C = Clear C1 - C6 = Light to Dark

NE

NE

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

NE

NE

W = Within Allowable Requirement; O = Outside Allowable Requirement

.001

100

OT = Material Tested Beyond Temperature Range

NE

NE

TEST MATERIAL / FUEL EXPOSURE

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation
 UDRI ENG:
 B. WILT

 UDRI P.I. ENG:
 D.H. KALT

 A.F. AUT. W./MLSE:
 A. FLETCHER

 A.F. AUT. WL/POSF
 S. A. ANDERSON

150

EVALUATION OF TEST RESULTS

NE

NE

600

24 MAR 98

J. DUES

NE

NE

NE

NE

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

NE

NE

TEST EVALUATION CRITERIA

ALLOWABLE TOLERANCE

TEST PLAN I.D. NO. II.G.1 **MATERIAL / IDENTITY:** FLUOROSILICONE, MIL-R-25988 TEST TEMPERATURE (°F) 325 USE: ENGINE / AIRFRAME, FUEL SYSTEM, GASKET FUEL CONT. 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: 7 SEPT '94 **TEST DATE START:** JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

CONTROL MAT

										0 0 1 1 1 1 1 1 1			1	,	_
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIF	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	NT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	231	276	279	11	.87	45%				-31	-77	-76	OT	OT	OT
ELONGATION (%)	64	56	64	18	83	35				-65	-69	-65	OT	OT	OT
VOLUME SWELL (%)	6	5	5	N	/A		0		25	P	P	P	W	\mathbf{W}	W
HARD'S; a) SHORE A (PTS)	65	66	66	7	' 4	20				-9	-8	-8	W	W	W
b) PENCIL															
COMP. SET (%) (avg. 2 spcm's)	54	60	60	N	/A				30	F	F	F	OT	ТО	OT
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL			1					
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEW)	VS. POST (S	TRESSED) °32	5 F 7 DAYS		SPECI	FICATION	RANGE	(GENERAI	
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	2-8	JP-8	+ 100	JP-8 +	100 x4	1	FOR JP-8		OBS	SERVATIO	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	С	C2	С	C2	С	C2				NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.007	.001	.006	.003	.008			0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	2	3	4.4	3.4	9.6	12.2			7	NE	NE	NE
							~ -								

0

248

.015

141

0

912

.008

555

NOTES:

HYDROPEROXIDES mM/l

CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

MATERIAL

Fuel Color: C = Clear C1 - C6 = Light to Dark

NE

NE

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = F

NE

NE

W = Within Allowable Requirement; O = Outside Allowable Requirement

.004

108

OT = Material Tested Beyond Temperature Range

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

NE

NE

TEST MATERIAL / FUEL EXPOSURE

RESULTS

DATE: 24 MAR 98
UDRI TECH: J. DUES
UDRI ENG: B. WILT
UDRI P.I. ENG: D.H. KALT
A.F. AUT. W./MLSE: A. FLETCHER
A.F. AUT. WL/POSF S. A. ANDERSON

150

EVALUATION OF TEST RESULTS

OVERALL

NE

NE

600

NE

NE

NE

NE

COMPARISON TO CONTROL &

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

.017

123

TEST EVALUATION CRITERIA

EVALUATION OF TEST RESULTS

TEST PLAN I.D. NO. II.G.2 MATERIAL / IDENTITY: FLUOROSILICONE, MIL-R-25988 TEST TEMPERATURE (°F) 250 USE: ENGINE / AIRFRAME, FUEL SYSTEMS GASKET 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: 20 JUN '95 **TEST DATE START:** JP-8 BASELINE FUEL: 92 POSF 2980 + (JP-8 Additives)

MATERIAL		RESULTS		CONTROL MAT		Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO C	ONTROL &	•	OVERAL	<u>. </u>
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIR	REMENT		ALLOWA	BLE REQU	IREMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	162	546	562	98	34	45%				-84	-45	-43	OT	W	W
ELONGATION (%)	130	225	192	19	95	35				-33	+15	-2	\mathbf{W}	W	W
VOLUME SWELL (%)	4	9	8	N.	/ A		0		25	P	P	P	\mathbf{W}	W	\mathbf{W}
HARD'S; a) SHORE A (PTS)	44	54	58	6	5	20				-21	-11	-7	OT	W	\mathbf{W}
b) PENCIL															
COMP. SET (%) (avg. 2 spcm's)	18	NT	NT	N.	/ A				30	P	NE	NE	\mathbf{W}	NE	NE
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEW)	VS. POST (S	TRESSED) 250	0°F 7 DAYS		SPECI	FICATION	RANGE		GENERA	
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JP	P-8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-8		OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	C	C1	C	C1	C	C1				NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.002	.003	.003	.003	.002			0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	.6	3.6	4.0	4	9.6	6.4			7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.001	.01	.22	.01	0	.01				NE	NE	NE
CONDUCTIVITY pS/m @72°F	NE	NE	NE	100	NE	248	NE	912	NE	150		600	NE	NE	NE

NOTES:

VISUAL OBSERVATIONS

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

W = Within Allowable Requirement; O = Outside Allowable Requirement

OT = Material Tested Beyond Temperature Range

TEST MATERIAL / FUEL EXPOSURE

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

A.F. AUT. WL/POSF

S. A. ANDERSON

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

DATE:

UDRI TECH:

UDRI P.I. ENG:

UDRI ENG:

24 MAR 98

J. DUES

B. WILT

D.H. KALT

TEST PLAN I.D. NO. II.G.2/I.G.5 **MATERIAL / IDENTITY:** FLUOROSILICONE "O" RING MIL-R-25988 TEST TEMPERATURE (°F) 325 USE: **ENGINE COMPONENTS** 28 **TEST ADDITIVE/FUEL:** Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** 7 SEPT '94 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

	TEST MAT	TERIAL / FUEL	EXPOSURE	TEST	TEVALUA'	TION CRIT	TERIA		EVAI	LUATIO	OF TE	ST R	ESULT	ΓS
MATERIAL		RESULTS		CONTROL MAT	A	LLOWABLE	TOLERAN	ICE	COMPAR	ISON TO CO	NTROL &		OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUII	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	VALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	121	131	139	896	45%				-86	-85	-84	OT	OT	OT
ELONGATION (%)	88	96	82	214	35				-59	-55	-62	OT	OT	OT
VOLUME SWELL (%)	11	10	10	N/A		0		25	P	P	P	W	W	W
HARD'S; a) SHORE A (PTS)	38	40	41	67	20				-29	-27	-26	OT	OT	OT
b) PENCIL														
COMP. SET (%) (avg. 2 spcm's)	60	60	57	N/A				30	F	F	F	OT	OT	OT
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														
	TEST FUE	L / MATERIAL	EXPOSURE		CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)	PRE-NEW) VS. POST (S	TRESSED) 32	5°F 7 DAYS		SPECI	IFICATION I	RANGE		GENERAL	L

	TEST FUEI	L/MATERIAL	EXPOSURE			CONTR	OL FUEL							
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEW)	VS. POST (ST	TRESSED) 325	5°F 7 DAYS		SPECIFICAT	TION RANGE	(GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	?-8	JP-8	+ 100	JP-8 +	100 x4	FOR	JP-8	OBS	ERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	С3	C3	С3	С	C2	С	C2	С	C2			W	W	W
ACID NO. mgKOH/gm	.003	.010	.004	.001	.007	.001	.006	.003	.008		0.015	\mathbf{W}	W	W
GUMS mg/100ml	12.0	13.6	20.0	2	3	4.4	3.4	9.6	12.2		7	О	0	О
HYDROPEROXIDES mM/l	.025	.001	NE	.004	.017	0	.015	0	.008			0	W	NE
CONDUCTIVITY pS/m @72°F	343	1011	627	108	123	248	141	912	555	150	600	\mathbf{W}	O	W
VISUAL OBSERVATIONS														

DATE:

UDRI TECH:

UDRI P.I. ENG:

UDRI ENG:

24 MAR 98

J. DUES

B. WILT

D.H. KALT

NOTES:

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

W = Within Allowable Requirement; O = Outside Allowable Requirement

OT = Material Tested Beyond Temperature Range

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

A.F. AUT. WL/POSF

S. A. ANDERSON

TEST PLAN I.D. NO. II.G.3/I.G.7 **MATERIAL / IDENTITY:** FLUOROCARBON, MIL-R-83485 TEST TEMPERATURE (°F) 325 USE: ENGINE / AIRFRAME, FUEL SYSTEM GASKETS, "O" RING 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL:** 7 SEPT '94 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

	TEST MAT	FERIAL / FUEL	EXPOSURE	TEST	EVALUA'	TION CRIT	TERIA		EVAI	LUATION	OF TE	ST R	ESULT	rs
MATERIAL		RESULTS		CONTROL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	NTROL &	(OVERAL	<u> </u>
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUIF	REMENT		ALLOWA	BLE REQUIF	REMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	1260	1259	1265	1644	20%				-23	-23	-23	W	W	W
ELONGATION (%)	168	166	174	166	20%				+1	0	+5	\mathbf{W}	W	\mathbf{W}
VOLUME SWELL (%)	7	8	7	N/A		0		10	P	P	P	\mathbf{W}	W	W
HARD'S; a) SHORE A (PTS)	72	73	73	76	5		5		-4	-3	-3	\mathbf{W}	W	W
b) PENCIL														
COMP. SET (%) (avg. 2 spcm's)	51	46	51	N/A				60	P	P	P	\mathbf{W}	W	W
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														
					,	,							,	

	TEST FUEL	L / MATERIAL	EXPOSURE			CONTR	OL FUEL							
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEW)	VS. POST (S	TRESSED) 325	5°F 7 DAYS		SPECIFICAT	TION RANGE		GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR	JP-8	OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	С3	C4	C2	C	C2	С	C2	C	C2			W	0	W
ACID NO. mgKOH/gm	NE	.009	NE	.001	.007	.001	.006	.003	.008		0.015	NE	W	N
														\mathbf{W}
GUMS mg/100ml	3.6	7.4	26	2	3	4.4	3.4	9.6	12.2		7	\mathbf{W}	O	О
HYDROPEROXIDES mM/l	NE	.001	NE	.004	.017	0	.015	0	.008			NE	W	NE
CONDUCTIVITY pS/m @72°F	29	54	418	108	123	248	141	912	535	150	600	О	0	W
VISUAL OBSERVATIONS														

DATE:

UDRI TECH:

UDRI ENG:

24 MAR 98

J. DUES

B. WILT

NOTES:

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

W = Within Allowable Requirement; O = Outside Allowable Requirement

OT = Material Tested Beyond Temperature Range N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

UDRI P.I. ENG: D.H. KALT

A.F. AUT. W./MLSE: A.FLETCHER

A.F. AUT. WL/POSF S. A. ANDERSON

TEST EVALUATION CRITERIA

EVALUATION OF TEST RESULTS

TEST PLAN I.D. NO. II.G.3/I.G.7 **MATERIAL / IDENTITY:** FLUOROCARBON, MIL-R-83485 TEST TEMPERATURE (°F) 400 USE: ENGIN /AIRFRAME, FUEL SYSTEM GASKETS, "O" RING 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: 29 OCT '96 **TEST DATE START:** JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

													<u> </u>		10
MATERIAL		RESULTS		CONTRO	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	ONTROL &	(OVERALI	<u>. </u>
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIR	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	1301	1333	1329	16	44	20%				-21	-19	-19	W	W	W
ELONGATION (%)	161	162	155	10	56	20				-3	-2	-7	W	W	W
VOLUME SWELL (%)	9	8	8	N.	/A		0		10	P	P	P	\mathbf{W}	W	W
HARD'S; a) SHORE A (PTS)	71	71	71	7	6	5		5		-5	-5	-5	W	W	W
b) PENCIL														'	
COMP. SET (%) (avg. 2 spcm's)	37	29	35	N.	/A				60	P	P	P	W	W	W
LAP SHEAR (PSI)														·	
COHESION (%)														1	
TAPE ADHESION (P/F)														·	
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)														·	
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)														·	
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS														·	
	TEST EILE	L / MATERIAL	EXPOSIDE			CONTR	OL EUEL			li .					
	TEST FUE	L/WATERIAL	EAI OSUKE				OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEW) VS. POST (S	TRESSED) 400	9°F 7 DAYS		SPECI	IFICATION :	RANGE	(GENERAI	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JF	P-8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-8		OBS	SERVATIO	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	C	С3	C	С3	C	С3				NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.009	.001	.008	.003	.012			0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	2	4.8	4.4	8.4	9.6	22.4			7	NE	NE	NE
HYDROPEROXIDES mM/I	NE	NE	NE	.004	.03	0	0	0	0				NE	NE	NE

NOTES:

CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

Fuel Color: C = Clear C1 - C6 = Light to Dark

NE

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fa

NE

W = Within Allowable Requirement; O = Outside Allowable Requirement

108

OT = Material Tested Beyond Temperature Range

NE

TEST MATERIAL / FUEL EXPOSURE

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

A.F. AUT. WL/POSF

S. A. ANDERSON

5

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

248

932

5

428

DATE:

UDRI TECH:

UDRI P.I. ENG:

UDRI ENG:

150

600

24 MAR 98

J. DUES

B. WILT

D.H. KALT

NE

NE

NE

TEST EVALUATION CRITERIA

EVALUATION OF TEST RESULTS

TEST PLAN I.D. NO. II.G.4/I.G.8 **MATERIAL / IDENTITY:** PERFLUOROELASTOMER, AMS 7257 TEST TEMPERATURE (°F) 325 USE: ENGINE / AIRFRAME, FUEL SYSTEMS, GASKET "O" RING 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: 25 OCT '94 **TEST DATE START:** JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

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MATERIAL		RESULTS		CONTR	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO (CONTROL &	(OVERALI	<u>. </u>
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIR	REMENT		ALLOWA	BLE REQU	IREMENTS	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	2011	2168	2161	23	13	20%				-13	-6	-7	W	W	W
ELONGATION (%)	155	123	124	11	10	15				+5	+12	+13	W	W	W
VOLUME SWELL (%)	3	3	3	N	/A		0		5	P	P	P	W	\mathbf{W}	W
HARD'S; a) SHORE A (PTS)	82	83	82	8	4	5		5		-2	-1	-2	W	W	W
b) PENCIL															
COMP. SET (%) (avg. 2 spcm's)	57	54	54	N	/A				60	P	P	P	W	W	W
LAP SHEAR (PSI)															
COHESION (%)													i		
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)													i		
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)													i		
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST FILE	L / MATERIAL	EVDOCUDE	Ī		CONTEN	OF PURI			ľ					
	IESI FUE.	L/MATERIAL	EAFOSURE				OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEW)	VS. POST (S	TRESSED) 325	5°F 7 DAYS		SPECI	FICATION	RANGE	(GENERAI	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	P-8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-8	3	OBS	SERVATIO	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	C3	C3	С3	C	C2	C	C2	C	C2				W	W	W
ACID NO. mgKOH/gm	NE	NE	NE	.001	.007	.001	.006	.003	.008			0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	2	3	4.4	3.4	9.6	12.2			7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.004	.017	0	.015	0	.008				NE	NE	NE
CONDUCTIVITY pS/m @72°F	25	167	348	108	123	248	141	912	555	150		600	О	\mathbf{W}	W

NOTES:

VISUAL OBSERVATIONS

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Not Evaluated: ND = Not Detected: **Designations:** NE =BD = Below Detection: P = Pass:

W =Within Allowable Requirement; O = Outside Allowable Requirement

OT =**Material Tested Beyond Temperature Range**

TEST MATERIAL / FUEL EXPOSURE

N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists **Between Material Degradation and Fuel Properties Degradation**

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

DATE:

UDRI TECH:

UDRI P.I. ENG:

UDRI ENG:

24 MAR 98

J. DUES

B. WILT

A.F. AUT. W./MLSE: A. FLETCHER

A.F. AUT. WL/POSF S. A. ANDERSON

D.H. KALT

TEST EVALUATION CRITERIA

EVALUATION OF TEST RESULTS

NSR

TEST PLAN I.D. NO. **II.G.5** MATERIAL / IDENTITY: FLUOROSILICONE, MIL-R-25988 (Modified) ENGINE / AIRFRAME, FUEL SYSTEM GASKETS, "O" RINGS TEST TEMPERATURE (°F) 275 USE: 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: **TEST DATE START:** 17 JAN '96 JP-8 BASELINE FUEL: **92 POSF 2980** + (**JP-8 Additives**)

MATERIAL		RESULTS		CONTRO	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	NTROL &	(OVERALI	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIR	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	NT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	BROKE	BROKE	BROKE	90	56	45%				-100	-100	-100	OT	OT	OT
ELONGATION (%)	BROKE	BROKE	BROKE	13		35				-100	-100	-100	OT	OT	OT
VOLUME SWELL (%)	BROKE	BROKE	BROKE	N.	/ A		0		25	F	F	F	OT	OT	OT
HARD'S; a) SHORE A (PTS) b) PENCIL	BROKE	BROKE	BROKE	6	57	20				F	F	F	ОТ	OT	OT
COMP. SET (%) (avg. 2 spcm's)	62	78	76	N.	/A				30	F	F	F	ОТ	OT	ОТ
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST FUEI	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEW	VS. POST (S	TRESSED) °27	5F 7 DAYS		SPECI	FICATION I	RANGE	(GENERAI	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	P-8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-8		OBS	SERVATION	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	С	C2	С	C2	С	C2				NE	NE	NSR
ACID NO. mgKOH/gm	NE	NE	NE	.001	NE	.003	.03	.003	.02			0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	.6	NE	4.0	13.0	9.6	41.8			7	NE	NE	NSR
HYDROPEROXIDES mM/l	NE	NE	NE	.001	NE	.22	0.0	0	0.0				NE	NE	NS R

NOTES:

CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

Fuel Color: C = Clear C1 - C6 = Light to Dark

NE

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

NE

W = Within Allowable Requirement; O = Outside Allowable Requirement

100

OT = Material Tested Beyond Temperature Range

NE

TEST MATERIAL / FUEL EXPOSURE

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

A.F. AUT. WL/POSF

S. A. ANDERSON

120

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

248

141

912

555

DATE:

UDRI TECH:

UDRI P.I. ENG:

UDRI ENG:

150

600

24 MAR 98

J. DUES

B. WILT

D.H. KALT

NE

NE

TEST EVALUATION CRITERIA

EVALUATION OF TEST RESULTS

NSR

TEST PLAN I.D. NO. **II.G.5 MATERIAL / IDENTITY:** FLUOROSILICONE MIL-R-25988 (Modified) TEST TEMPERATURE (°F) 325 USE: ENGINE /AIRFRAME, FUEL SYSTEMS GASKETS, "O" RINGS 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: 7 SEPT '94 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

MATERIAL		RESULTS		CONTR	OL MAT	A.	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO C	ONTROL &	(OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIF	REMENT		ALLOWA	BLE REQU	IREMENTS	E	VALUATION	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	237	201	135	90	56	45%				-75	-79	-86	OT	OT	OT
ELONGATION (%)	138	116	92	13	35	35				+2	-14	-32	\mathbf{W}	\mathbf{W}	\mathbf{W}
VOLUME SWELL (%)	12	11	8	N	/A				25	P	P	P	\mathbf{W}	\mathbf{W}	\mathbf{W}
HARD'S; a) SHORE A (PTS) b) PENCIL	39	43	(SOFT)0	6	7	20				-28	-24	-67	ОТ	ОТ	ОТ
COMP. SET (%) (avg. 2 spcm's)	NT	NT	NT	N	/A				30	NE	NE	NE	NE	NE	NE
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS													<u> </u>	<u> </u>	
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEW) VS. POST (S	TRESSED) 325	5°F 7 DAYS		SPECI	IFICATION	RANGE		GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	P-8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-8		OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	C3	C4	С3	C	C2	С	C2	С	C2				NSR	NSR	NSR
ACID NO. mgKOH/gm	.002	.007	.006	.001	.007	.001	.006	.003	.008			0.015	W	W	W
GUMS mg/100ml				2	3	4.4	3.4	9.6	12.2			7	\mathbf{W}	OT	NSR
HYDROPEROXIDES mM/l				.004	.017	0	.015	0	.008				NSR	NSR	NSR

NOTES:

CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

Fuel Color: C = Clear C1 - C6 = Light to Dark

W = Within Allowable Requirement; O = Outside Allowable Requirement

OT = Material Tested Beyond Temperature Range

TEST MATERIAL / FUEL EXPOSURE

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

A.F. AUT. WL/POSF

S. A. ANDERSON

108

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

123

248

141

912

555

DATE:

UDRI TECH:

UDRI P.I. ENG:

UDRI ENG:

150

600

24 MAR 98

J. DUES

B. WILT

D.H. KALT

OT

OT

TEST EVALUATION CRITERIA

TEST PLAN I.D. NO. **II.G.6** MATERIAL / IDENTITY: FLUOROCARBON, MIL-R-83485 TEST TEMPERATURE (°F) 325 USE: ENGINE / AIRFRAME, FUEL SYSGEMS GASKETS "O" RINGS 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: 25 OCT '94 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

MATERIAL		RESULTS		CONTR	OL MAT	A]	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	ONTROL &	•	OVERALI	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIF	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	NT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	1924	1858	1875	23	882	20%				-19	-22	-21	W	W	W
ELONGATION (%)	226	204	217		93	20				+17	+6	+12	\mathbf{W}	W	\mathbf{W}
VOLUME SWELL (%)	7	7	7	N	/A		0		10	P	P	P	\mathbf{W}	W	\mathbf{W}
HARD'S; a) SHORE A (PTS) b) PENCIL	73	73	72	7	'5	5			5	-2	-2	-3	W	W	W
COMP. SET (%) (avg. 2 spcm's)	20	26	26	N	/A				60	P	P	P	W	W	W
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															<u> </u>
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEW) VS. POST (S	TRESSED) 325	5°F 7 DAYS		SPECI	FICATION	RANGE	(GENERAI	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	P-8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-8		OBS	SERVATION	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	С3	С3	С	C2	С	C2	С	C2				W	W	W
ACID NO. mgKOH/gm	.005	.004	ND	.001	.007	.001	.006	.003	.008			0.015	\mathbf{W}	W	W
GUMS mg/100ml	4	7	20.6	2	3	4.4	3.4	9.6	12.2			7	\mathbf{W}	W	О
HYDROPEROXIDES mM/l	.0114	.01	.019	.004	.017	0	.015	0	.008				\mathbf{W}	W	О

NOTES:

CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

Fuel Color: C = Clear C1 - C6 = Light to Dark

34

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

423

W = Within Allowable Requirement; O = Outside Allowable Requirement OT = Material Tested Beyond Temperature Range

108

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

168

TEST MATERIAL / FUEL EXPOSURE

Between Material Degradation and Fuel Properties Degradation

 DATE:
 24 MAR 98

 UDRI TECH:
 J. DUES

 UDRI ENG:
 B. WILT

 UDRI P.I. ENG:
 D.H. KALT

 A.F. AUT. W./MLSE:
 A. FLETCHER

 A.F. AUT. WL/POSF
 S. A. ANDERSON

600

O

 \mathbf{W}

W

150

EVALUATION OF TEST RESULTS

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

123

248

141

912

555

TEST EVALUATION CRITERIA

EVALUATION OF TEST RESULTS

NE

NE

600

24 MAR 98

J. DUES

B. WILT

D.H. KALT

NE

NE

NE

NE

TEST PLAN I.D. NO. **II.G.6 MATERIAL / IDENTITY:** FLUOROCARBON, MIL-R-83485 TEST TEMPERATURE (°F) 400 USE: ENGINE/AIRFRAME, FUEL SYSTEM GASKETS "O" RINGS 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: 6 SEP 96 93 POSF 2980+ (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

444.755444		DEG. 17 MG		CONTROL MAT ALLOWABLE TOLERANCE					0015010	TG011 TT0 G	0.1mp.or. 0	1 .			
MATERIAL		RESULTS	1			Al		-	CE		ISON TO CO			OVERALI	
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU			REQUIR				BLE REQUI			ALUATION	-
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	1638	1677	1807	23	82	20%				-31	-30	-24	OT	OT	OT
ELONGATION (%)	188	189	199	19	93	20				-3	-2	+3	\mathbf{W}	\mathbf{W}	\mathbf{W}
VOLUME SWELL (%)	7	7	7	N.	/A		0		10	P	P	P	\mathbf{W}	\mathbf{W}	\mathbf{W}
HARD'S; a) SHORE A (PTS)	72	72	72	7	5	5		5		-3	-3	-3	\mathbf{W}	W	W
b) PENCIL															
COMP. SET (%) (avg. 2 spcm's)	33	29	30	N.	/ A				60	P	P	P	W	W	W
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST FILE	L / MATERIAL	EXPOSIDE			CONTEN	OL EUEL			1					
							OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEW)	VS. POST (S	TRESSED) 400	0°F 7 DAYS		SPECI	FICATION	RANGE	(GENERAL	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JF	P-8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-8		OBS	ERVATION	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	С	С3	C	С3	С	С3				NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.009	.001	.008	.003	.012			0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	2	4.8	4.4	8.4	9.6	224			7	NE	NE	NE
						_	_	_	_						

0

.932

5

0

428

DATE:

UDRI TECH:

UDRI P.I. ENG:

UDRI ENG:

150

NOTES:

HYDROPEROXIDES mM/l

CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

NE

NE

Not Evaluated: ND = Not Detected: **Designations:** NE =BD = Below Detection: P = Pass:

NE

NE

W =Within Allowable Requirement; O = Outside Allowable Requirement

OT =**Material Tested Beyond Temperature Range**

NE

NE

TEST MATERIAL / FUEL EXPOSURE

N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: A. FLETCHER Between Material Degradation and Fuel Properties Degradation A.F. AUT. WL/POSF S. A. ANDERSON

.004

108

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

.03

5

248

TEST EVALUATION CRITERIA

EVALUATION OF TEST RESULTS

TEST PLAN I.D. NO. **II.G.7 MATERIAL / IDENTITY:** FLUOROSILICONE, MIL-R-25988 TEST TEMPERATURE (°F) 325 USE: ENGINE/AIRFRAME, FUEL SYSTEM GASKETS "O" RING 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: 18 OCT '94 **TEST DATE START:** JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

MATERIAL		RESULTS		CONTROL MAT		AI	LLOWABLE	TOLERAN	CE	COMPAR	IS ON TO CO	NTROL &	(OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIR	EMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	339	247	352	10	88	45%				-69	-73	-68	OT	OT	OT
ELONGATION (%)	90	88	93	12	26	35				-29	-30	-26	\mathbf{W}	W	\mathbf{W}
VOLUME SWELL (%)	6	6	6	N	/ A		0		25	P	P	P	\mathbf{W}	\mathbf{W}	\mathbf{W}
HARD'S; a) SHORE A (PTS)	62	59	61	7	6	20				-14	-17	-15	\mathbf{W}	W	\mathbf{W}
b) PENCIL															
COMP. SET (%) (avg. 2 spcm's)	45	38	35	N/	/A				30	F	F	F	OT	OT	OT
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
					DDE MEM			0E # DANG		ann a				~=====	
FUELS		Y PERIODS (,				TRESSED) 325			SPECI	FICATION 1	RANGE		GENERA1	
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JP			+ 100		100 x4		FOR JP-8			SERVATI	
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	С3	C4	C4	C	C2	C	C2	C	C2				W	О	О
ACID NO. mgKOH/gm	.008	.010	.010	.001	.007	.001	.006	.003	.008			0.015	W	W	W
GUMS mg/100ml	6.4	7.0	14.4	2	3	4.4	3.4	9.6	12.2			7	\mathbf{W}	W	О
HYDROPEROXIDES mM/l	.024	.016	.016	0.004	0.017	0	0.015	0	0.008				0	O	О

NOTES:

CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

Fuel Color: C = Clear C1 - C6 = Light to Dark

82

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

507

W = Within Allowable Requirement; O = Outside Allowable Requirement

108

OT = Material Tested Beyond Temperature Range

126

TEST MATERIAL / FUEL EXPOSURE

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

A.F. AUT. WL/POSF

S. A. ANDERSON

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

128

248

141

912

535

DATE:

UDRI TECH:

UDRI P.I. ENG:

UDRI ENG:

150

600

24 MAR 98

J. DUES

B. WILT

D.H. KALT

O

0

W

TEST EVALUATION CRITERIA

EVALUATION OF TEST RESULTS

TEST PLAN I.D. NO. **II.G.8 MATERIAL / IDENTITY:** PERFLUOROELASTOMER, AMS 7257A TEST TEMPERATURE (°F) 325 USE: ENGINE/AIRFRAME, FUEL SYSTEM GASKETS "O" RING 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: 25 OCT '94 **TEST DATE START:** JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

MATERIAL		RESULTS		CONTRO	OL MAT	AI	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO C	ONTROL &	(OVERAL	Ĺ
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIR	REMENT		ALLOWA	BLE REQU	IREMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	1480	1435	1396	14	84	20%				0	-3	-6	W	W	W
ELONGATION (%)	132	129	128	12		15				+6	+4	+3	\mathbf{W}	W	\mathbf{W}
VOLUME SWELL (%)	3	3	3	N	/ A		0		5	P	P	P	\mathbf{W}	\mathbf{W}	\mathbf{W}
HARD'S; a) SHORE A (PTS)	74	74	74	7	5	5		5		-1	-1	-1	\mathbf{W}	W	\mathbf{W}
b) PENCIL															
COMP. SET (%) (avg. 2 spcm's)	68	71	64	N/	/A				60	F	F	F	O	0	О
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST FIIF	L / MATERIAL	EXPOSURE			CONTR	OL FUEL			<u> </u>					
													1		
FUELS		Y PERIODS (,		PRE-NEW)	VS. POST (S	TRESSED) 325	5°F 7 DAYS		SPECI	FICATION	RANGE	•	GENERA1	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JP	- -8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-8			SERVATI	
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	С3	С3	С3	C	C2	C	C2	C	C2				W	W	W
ACID NO. mgKOH/gm	.006	.007	.015	.001	.007	.001	.006	0.003	0.008			0.015	W	W	W
GUMS mg/100ml	12.6	14.2	224	2	3	4.4	3.4	9.6	12.2			7	0	0	О
HYDROPEROXIDES mM/l	.004	.011	0.00	.004	0.017	0	0.015	0	0.008				W	W	\mathbf{W}
CONDUCTIVITY pS/m @72°F	64	87	511	108	128	248	141	912	555	150		600	0	0	\mathbf{W}

NOTES:

VISUAL OBSERVATIONS

Fuel Color: C = Clear C1 - C6 = Light to Dark

TEST MATERIAL / FUEL EXPOSURE

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

W = Within Allowable Requirement; O = Outside Allowable Requirement

OT = Material Tested Beyond Temperature Range

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

A.F. AUT. WL/POSF

S. A. ANDERSON

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

DATE:

UDRI TECH:

UDRI P.I. ENG:

UDRI ENG:

24 MAR 98

J. DUES

B. WILT

D.H. KALT

TEST PLAN I.D. NO. II.G.9/I.G.6 **MATERIAL / IDENTITY:** FLUOROCARBON, MIL-R-83248 TEST TEMPERATURE (°F) 325 USE: ENGINE/AIRFRAME, FUEL SYSTEM GASKET "O" RING 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL:** 3 MAR'95 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

	TEST MAT	TERIAL / FUEL	EXPOSURE	TEST	EVALUA	TION CRIT	TERIA		EVAI	LUATIO	OF TE	ST R	ESULT	rs
MATERIAL		RESULTS		CONTROL MAT	A	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	NTROL &	(OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUIF	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	1200	1204	1113	1671	20%				-28	-28	-33	0	W	0
ELONGATION (%)	188	192	164	177	20				+6	+8	-7	\mathbf{W}	W	W
VOLUME SWELL (%)	6	5	4	N/A		0		10	P	P	P	\mathbf{W}	W	W
HARD'S; a) SHORE A (PTS)	72	72	72	75	5		5		-3	-3	-3	\mathbf{W}	W	W
b) PENCIL														
COMP. SET (%) (avg. 2 spcm's)	24	24	24	N/A				60	P	P	P	\mathbf{W}	W	W
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														
	TEST FUE	L / MATERIAL	EXPOSURE		CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS ((28 DAYS)	PRE-NEW)	VS. POST (S	TRESSED) 325	5°F 7 DAYS		SPECI	FICATION F	RANGE		GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JP-8	JP-8	+ 100	JP-8 +	100 x4	1	FOR JP-8		OBS	SERVATI	ONS
			+		+				11			ı——		

	TEST FUEL	L / MATERIAL	EXPOSURE			CONTR	OL FUEL							
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEW)	VS. POST (ST	TRESSED) 325	5°F 7 DAYS		SPECIFICAT	TION RANGE		GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	?-8	JP-8	+ 100	JP-8 +	100 x4	FOR	JP-8	OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	С3	C3	С3	С	C1	С	C2	С	C2			W	W	W
ACID NO. mgKOH/gm	.005	.007	.011	0.001	0.002	.001	.002	0.003	0.003		0.015	W	W	W
GUMS mg/100ml	3.8	6	15.6	2	4.8	4.4	2.8	9.6	8.6		7	W	\mathbf{W}	О
HYDROPEROXIDES mM/l	.002	.006	.006	0.004	0.037	0	0.032	0	0.018			W	\mathbf{W}	\mathbf{W}
CONDUCTIVITY pS/m @72°F	16	97	366	108	39	248	131	912	410	150	600	О	O	W
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

W = Within Allowable Requirement; O = Outside Allowable Requirement

OT = Material Tested Beyond Temperature Range

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists
Between Material Degradation and Fuel Properties Degradation

DATE: 24 MAR 98
UDRI TECH: J. DUES
UDRI ENG: B. WILT
UDRI P.I. ENG: D.H. KALT
A.F. AUT. W./MLSE: A.FLETCHER
A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. II.G.10/I.G.11 **MATERIAL / IDENTITY:** URETHANE, SEAL TEST TEMPERATURE (°F) 325 **USE:** ENGINE/AIRFRAME, FUEL SYSTEM PUMP WASHER 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL:** 2 JULY 96 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

	TEST MAT	TERIAL / FUEL	EXPOSURE	TEST EVALUATION CRITERIA						EVAI	LIATIO	N OF TE	ST R	ESIILT	ΓS
MATERIAL		RESULTS		CONTR			LOWABLE		CE			ONTROL &		OVERAL	
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)		RED AT	AI			CE						
	POST	POST	POST		T TEMP	DECREASE	REQUIR MIN VALUE	INCREASE	MAX	JP-8	JP-8+100	IREMENTS JP-8+100x4	JP8	/ALUATI	UN X4
(AVG. 5 SPECIMENS)	1031	1031	1031	AMBIEN	(I IEMI				VALUE	31-0	31-0+100	31-0+10014	31 0	+100	Ач
TENSILE (PSI)															
ELONGATION (%)															
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL															
COMP. SET (%) (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															,
LAMINAR SHEAR (PSI)															,
RESISTIVITY (OHM-CM)															,
TORQUE (INCH -LBS.)															,
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS	F	F	F]	P		P			F	F	F	OT	OT	OT
	TEST FUEL	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 77 7 70 4	V DEDIODG (30 D 4 5/G)		DDE NEW		FRESSED) 325	OF 7 DAVE		CDEC	FICATION	DANGE	1 .	GENERA	-
		Y PERIODS (,			SPECI				-	
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)		-8		+ 100	JP-8 +		100	FOR JP-8			SERVATI	
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	C	C1	C	C2	C	C2				NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	0.001	0.002	.001	.006	0.003	0.003			0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	2	2.2	4.4	3.4	9.6	12.2			7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	0.004	0.018	0	0.015	0	0.008				NE	NE	NE
CONDUCTIVITY pS/m @72°F	NE	NE	NE	108	1	248	141	912	555	150		600	NE	NE	NE
VISUAL OBSERVATIONS														•	

NOTES:

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Not Evaluated: ND = Not Detected: **Designations:** NE =BD = Below Detection; P = Pass; F = Fail

Within Allowable Requirement; W =O = Outside Allowable Requirement

OT =**Material Tested Beyond Temperature Range**

NSR = No Spec. Req. and/or 4 (x) Additive Concentration N/A =Not applicable;

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: A. FLETCHER A.F. AUT. WL/POSF S. A. ANDERSON

Between Material Degradation and Fuel Properties Degradation

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

DATE:

UDRI TECH:

UDRI P.I. ENG:

UDRI ENG:

24 MAR 98

J. DUES

B. WILT

D.H. KALT

TEST PLAN I.D. NO. II.G.11/I.G.12 MATERIAL / IDENTITY: URETHANE, TANG SEAL TEST TEMPERATURE (°F) 325 **USE:** ENGINE/AIRFRAME, FUEL SYSTEM PUMP TANG 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL:** 27 AUG '96 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

	TEST MAT	TERIAL / FUEL	EXPOSURE		TEST EVALUATION CRITERIA						LUATIO	N OF TE	ST R	ESULT	ΓS
MATERIAL		RESULTS		CONTRO	OL MAT	Α1	LOWABLE	TOI FRAN	CF			ONTROL &	п —	OVERAL	
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)		RED AT	Al	REOUIR		CE		BLE REOU			ALUATI	
(AVG. 5 SPECIMENS)	POST	POST	POST		T TEMP	DECREASE	MIN VALUE	INCREASE	MAX	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
, , , , , , , , , , , , , , , , , , ,									VALUE						
TENSILE (PSI)															
ELONGATION (%)															
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL															
COMP. SET (%) (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS	F	F	F	l	2		P			F	F	F	OT	OT	OT
	TEST FUEL	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAVS)		PRE-NEW)	VS. POST (ST	TRESSED) 325	5°F 7 DAYS		SPECI	FICATION	RANGE		GENERA	Г.
PROPERTY TESTS*	.IP-8	JP-8 +100	JP8+100 (X4)	11	·-8		+ 100		100 x4	SI EC.	FOR JP-8	ILLI (GE		SERVATION	
PROPERTY TESTS	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	FUK JI -0	MAX	JP8	+100	X4
	1051	1051	1051	I KE	1031	FKE	1031	TKE	1031	- IVIII V		IVIZX	310	1100	21.7
COLOR (7 DAYS)	NE	NE	NE	C	C1	C	C2	C	C2				NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	0.001	0.002	.001	.006	0.003	0.003			0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	2	2.2	4.4	3.4	9.6	12.2			7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	0.004	0.018	0	0.015	0	0.008				NE	NE	NE
CONDUCTIVITY pS/m @72°F	NE	NE	NE	108	1	248	141	912	555	150		600	NE	NE	NE
VISUAL OBSERVATIONS															

NOTES:

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

W = Within Allowable Requirement; O = Outside Allowable Requirement

OT = Material Tested Beyond Temperature Range

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

A.F. AUT. W./MLSE: A.F. AUT. WL/POSF
S. A. ANDERSON

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

DATE:

UDRI TECH:

UDRI P.I. ENG:

UDRI ENG:

24 MAR 98

J. DUES

B. WILT

D.H. KALT

TEST EVALUATION CRITERIA

EVALUATION OF TEST RESULTS

TEST PLAN I.D. NO. II.G.12 **MATERIAL / IDENTITY:** FLUOROCARBON, MIL-R-83485 TEST TEMPERATURE (°F) 325 USE: ENGINE/AIRFRAME, FUEL SYSTEM, GASKET "O" RINGS 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: 2 JULY 96 **TEST DATE START:** JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

MATERIAL		RESULTS		CONTR	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO	CONTROL &	-	OVERALI	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIR	REMENT		ALLOWA	BLE REQ	UIREMENTS	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	1406	1438	1443	17	95	20%				-22	-20	-20	W	W	W
ELONGATION (%)	181	185	188	15	51	20				+20	+23	+25	W	W	W
VOLUME SWELL (%)	NE	NE	NE	N.	/A		0		10						
HARD'S; a) SHORE A (PTS)	NE	NE	NE	7	6	5		5							
b) PENCIL															
COMP. SET (%) (avg. 2 spcm's)	NE	NE	NE	N.	/A				60						-
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST FIIF	L / MATERIAL	EXPOSIDE			CONTRA	OI EIIEI			1					
							OL FUEL								
FUELS		Y PERIODS (/		PRE-NEW)	VS. POST (S	TRESSED) 32	5°F 7 DAYS		SPECI	FICATIO	N RANGE	(GENERAI	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	_	P-8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-			SERVATION	
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	C	C1	C	C2	C	C2				NE	NE	NE
ACID NO. mgKOH/gm	.006	.008	.008	0.001	0.002	.001	.006	0.003	0.008			0.015	\mathbf{W}	W	W
GUMS mg/100ml	4.0	7.2	15.0	2	2.2	4.4	3.4	9.6	12.2			7	\mathbf{W}	W	0
HYDROPEROXIDES mM/l	.005	ND	ND	0.004	0.018	0	0.015	0	0.008				W	0	0
CONDUCTIVITY pS/m @72°F	NE	NE	NE	108	1	248	141	912	555	150		600	NE	NE	NE

NOTES:

VISUAL OBSERVATIONS

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Not Evaluated: ND = Not Detected: **Designations:** NE =BD = Below Detection: P = Pass: F = Fail

W =Within Allowable Requirement; O = Outside Allowable Requirement

OT =**Material Tested Beyond Temperature Range**

TEST MATERIAL / FUEL EXPOSURE

N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

D.H. KALT * Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: A. FLETCHER Between Material Degradation and Fuel Properties Degradation A.F. AUT. WL/POSF S. A. ANDERSON

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

DATE:

UDRI TECH:

UDRI P.I. ENG:

UDRI ENG:

24 MAR 98

J. DUES

B. WILT

TEST PLAN I.D. NO. II.G.12 **MATERIAL / IDENTITY:** FLUOROCARBON, MIL-R-83485 TEST TEMPERATURE (°F) 400 USE: ENGINE/AIRFRAME, FUEL SYSTEM, GASKETS "O" RING 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **TEST ADDITIVE/FUEL: EXPOSURE TIME (DAYS)** 22 AUG '96 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

	TEST MAT	ERIAL / FUEL	EXPOSURE	TEST	EVALUA'	TION CRIT	TERIA		EVAI	LUATIO	OF TES	ST R	ESUL	ΓS
MATERIAL		RESULTS		CONTROL MAT	A.	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	NTROL &	(OVERAL	
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUI	REMENT		ALLOWA	BLE REQUII	REMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	1451	1468	1459	1795	20%				-19	-18	-19	W	W	W
ELONGATION (%)	157	166	164	151	20				+4	+10	+9	\mathbf{W}	W	W
VOLUME SWELL (%)	7	6	6	N/A		0		10	P	P	P	\mathbf{W}	\mathbf{W}	W
HARD'S; a) SHORE A (PTS)	73	74	73	76	5		5		-3	-2	-3	\mathbf{W}	W	W
b) PENCIL														
COMP. SET (%) (avg. 2 spcm's)	NE	NE	NE	N/A				60						
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														

	TEST FUEL / MATERIAL EXPOSURE					CONTRO	OL FUEL								
FUELS	4 X 7 DAY PERIODS (28 DAYS)				PRE-NEW)		TRESSED) 325	5°F 7 DAYS	SPECIFICATION RANGE			GENERAL			
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JP-8		JP-8 + 100		JP-8 + 100 x4		FOR JP-8		OBSERVATIONS			
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4	
COLOR (7 DAYS)	С3	C3	С3	С	С3	С	С3	С	С3			W	W	W	
ACID NO. mgKOH/gm	.005	.009	.013	.001	.009	.001	.008	.003	.012		0.015	W	W	W	
GUMS mg/100ml	4.4	9.8	23.4	2	4.8	4.4	8.4	9.6	22.4		7	\mathbf{W}	О	О	
HYDROPEROXIDES mM/l	.03	.01	.04	.004	.03	0	0	0	0			W	0	О	
CONDUCTIVITY pS/m @72°F	19	114	429	108	5	248	5	932	428	150	600	О	О	W	
VISUAL OBSERVATIONS															

NOTES:

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

W = Within Allowable Requirement; O = Outside Allowable Requirement

OT = Material Tested Beyond Temperature Range

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation DATE: 24 MAR 98
UDRI TECH: J. DUES
UDRI ENG: B. WILT
UDRI P.I. ENG: D.H. KALT
A.F. AUT. W./MLSE: A. FLETCHER

A.F. AUT. WL/POSF S. A. ANDERSON

TEST EVALUATION CRITERIA

ALLOWABLE TOLERANCE

EVALUATION OF TEST RESULTS

OVERALL

NE

0

600

24 MAR 98

J. DUES

B. WILT

D.H. KALT

NE

 \mathbf{W}

NE

0

COMPARISON TO CONTROL &

TEST PLAN I.D. NO. II.G.13 **MATERIAL / IDENTITY:** FLUOROSILICONE, MIL-R-25988 TEST TEMPERATURE (°F) 200 USE: ENGINE/AIRFRAME, FUEL SYSTEM, GASKETS "O" RING 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: 8 OCT '96 **92 POSF 2926 + (JP-8 Additives) TEST DATE START:** JP-8 BASELINE FUEL:

CONTROL MAT

IVIAILKIAL	RESULTS			COLUIN	OL WELL	AI	LLOWABLE	IOLEKAN	CE	COMI ARISON TO CONTROL &				OVERALL		
PROPERTY TESTS	JP-8 JP-8 +100 JP8+100 (X4)			MEASU	RED AT		REQUIR	REMENT		ALLOWABLE REQUIREMENTS			EVALUATION			
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	NT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4	
TENSILE (PSI)	604	581	671	94	4 2	45%				-36	-38	-29	W	W	W	
ELONGATION (%)	119	124	119	11	12	35				+6	+11	+6	\mathbf{W}	\mathbf{W}	\mathbf{W}	
VOLUME SWELL (%)	5	4	4	N.	/A		0		5	P	P	P	\mathbf{W}	W	W	
HARD'S; a) SHORE A (PTS)	67	67	68	7	'3	20				-6	-6	-5	\mathbf{W}	W	\mathbf{W}	
b) PENCIL																
COMP. SET (%) (avg. 2 spcm's)	19	25	31	N/A					30	P	P	P	\mathbf{W}	W	W	
LAP SHEAR (PSI)																
COHESION (%)																
TAPE ADHESION (P/F)																
PEEL STRENGTH (LB/IN)															,	
LAMINAR SHEAR (PSI)															,	
RESISTIVITY (OHM-CM)																
TORQUE (INCH -LBS.)															,	
RUPTURE PRESS. (IN.HG)																
VISUAL OBSERVATIONS																
	TEST FUEL / MATERIAL EXPOSURE						OL FUEL									
FUELS	4 X 7 DAY PERIODS (28 DAYS)				PRE-NEW)	VS. POST (ST	SPECIFICATION RANGE			GENERAL						
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JP-8		JP-8	+ 100	JP-8 + 100 x4		FOR JP-8			OBSERVATIONS			
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4	
COLOR (7 DAYS)	C1	C1	C1	С	C1	C	C1	C	C1				W	W	W	
ACID NO. mgKOH/gm	NE	NE	NE	.001	.001	.001	.002	.003	.003			0.015	\mathbf{W}	W	W	
GUMS mg/100ml	2.8	6.6	18.0	.6	.8	4.4	2.8	9.6	8.6			7	\mathbf{W}	W	О	
·						1 -		1 -							I	

0

248

.032

131

0

912

.018

410

DATE:

UDRI TECH:

UDRI P.I. ENG:

UDRI ENG:

150

NOTES:

HYDROPEROXIDES mM/l

CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

MATERIAL

Fuel Color: C = Clear C1 - C6 = Light to Dark

NE

129

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

NE

707

W = Within Allowable Requirement; O = Outside Allowable Requirement

OT = Material Tested Beyond Temperature Range

NE

424

TEST MATERIAL / FUEL EXPOSURE

RESULTS

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

A.F. AUT. WL/POSF

S. A. ANDERSON

.001

100

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

.002

66

TEST PLAN I.D. NO. II.G.13 **MATERIAL / IDENTITY:** FLUOROSILICONE, MIL-R-25988 TEST TEMPERATURE (°F) 325 USE: ENGINE/AIRFRAME, FUEL SYSTEM, GASKETS "O" RING 28 Betz/Dearborn 8O462 ((Normal and x4 Concentrations) /93 POSF 2980 EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL: 26 SEPT '96 TEST DATE START: JP-8 BASELINE FUEL: **93 POSF 2980** + (**JP-8 Additives**)

TEST MATERIAL / FUEL EXPOSURE TEST EVALUATION CRITERIA **EVALUATION OF TEST RESULTS** CONTROL MAT **MATERIAL** COMPARISON TO CONTROL & RESULTS ALLOWABLE TOLERANCE OVERALL JP-8 JP-8 +100 JP8+100 (X4) MEASURED AT PROPERTY TESTS ALLOWABLE REQUIREMENTS REQUIREMENT EVALUATION DECREASE POST POST POST AMBIENT TEMP MIN VALUE INCREASE JP-8+100 JP-8+100x4 JP8 +100 X4 (AVG. 5 SPECIMENS) VALUE TENSILE (PSI) **BROKE** 101 13 942 45% -100 -89 -99 OT OT OT -73 -73 **ELONGATION (%) BROKE** 30 30 112 35 -100 OT OT OT **VOLUME SWELL (%)** -2 -3 25 F -15 N/A 0 F F OT OT OT 73 84 -74 73 20 +11 \mathbf{W} \mathbf{W} W HARD'S: a) SHORE A (PTS) +1 0 b) PENCIL COMP. SET (%) (avg. 2 spcm's) 52 54 49 N/A 30 F F F OT OT OT LAP SHEAR (PSI) COHESION (%) TAPE ADHESION (P/F) PEEL STRENGTH (LB/IN) LAMINAR SHEAR (PSI) RESISTIVITY (OHM-CM) TOROUE (INCH -LBS.) RUPTURE PRESS. (IN.HG) VISUAL OBSERVATIONS

	TEST FUEL	./MATERIAL	EXPOSURE			CONTR	OL FUEL			Ì				
	ILSI I CLI	37 MATERIA	Lan obere				_							
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEW)	VS. POST (ST	TRESSED) 325	5°F 7 DAYS		SPECIFICAT	TION RANGE	(GENERA:	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR	JP-8	OBS	SERVATI	ONS
	POST	POST	POST	PRE POST		PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	C4	C4	C4	C C1		С	C2	С	C2			0	О	0
ACID NO. mgKOH/gm	.005	.010	.010	0.001	0.002	.001	.006	0.003	0.008		0.015	\mathbf{W}	\mathbf{W}	W
GUMS mg/100ml	12.2	9.0	25.2	0.6	2.2	4.4	3.4	9.6	12.1		7	О	О	0
HYDROPEROXIDES mM/l	0.00	0.00	0.00	.001	0.018	0	0.015	0	0.008			\mathbf{W}	W	W
CONDUCTIVITY pS/m @72°F	90	89	218	100	1	248	141	912	555	150	600	О	О	W
VISUAL OBSERVATIONS														

DATE:

UDRI TECH:

UDRI ENG:

24 MAR 98

J. DUES

B. WILT

NOTES:

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Not Evaluated: ND = Not Detected: **Designations:** NE =BD = Below Detection: P = Pass: F = Fail

W =Within Allowable Requirement: O = Outside Allowable Requirement

OT =**Material Tested Beyond Temperature Range**

NSR = No Spec. Reg. and/or 4 (x) Additive ConcentrationN/A =Not applicable;

UDRI P.I. ENG: D.H. KALT * Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: A. FLETCHER Between Material Degradation and Fuel Properties Degradation A.F. AUT. WL/POSF S. A. ANDERSON

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

TEST EVALUATION CRITERIA

EVALUATION OF TEST RESULTS

150

600

24 MAR 98

J. DUES

B. WILT

D.H. KALT

 \mathbf{W}

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TEST PLAN I.D. NO. II.G.14 **MATERIAL / IDENTITY:** FLUOROSILICONE, MIL-R25988 AIRFRAME, "O" RING ENGINE FUEL CONTROL TEST TEMPERATURE (°F) 180 USE: 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: 13 MAR '96 **92 POSF 2926 + (JP-8 Additives) TEST DATE START:** JP-8 BASELINE FUEL:

	-				11231	LVALUA	HON CKI	LIXIA		EVAL	JUATIC	N OF IE	\mathbf{v}	ESUL!	19
MATERIAL		RESULTS		CONTRO	OL MAT	AI	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO C	ONTROL &	(OVERALI	[
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIR	REMENT		ALLOWA	BLE REQU	IREMENTS	EV	VALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	807	861	943	94	18	45%				-15	-9	-1	W	W	W
ELONGATION (%)	207	218	243	21	13	35				-3	+2	+14	\mathbf{W}	\mathbf{W}	\mathbf{W}
VOLUME SWELL (%)	7	7	7	N	/ A		0		25	P	P	P	\mathbf{W}	\mathbf{W}	\mathbf{W}
HARD'S; a) SHORE A (PTS)	69	70	71	6	3	20				+6	+7	+8	W	W	W
b) PENCIL															<u> </u>
COMP. SET (%) (avg. 2 spcm's)	22	26	28	N/	/A				30	P	P	P	W	W	W
LAP SHEAR (PSI)														<u> </u>	ļ
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)														<u> </u>	
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST FUEL	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEW)	VS. POST (ST	TRESSED) 325	5°F 7 DAYS		SPECI	FICATION	RANGE	Ι (GENERAI	
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JP	2-8	JP-8	+ 100	.IP-8 +	100 x4	1	FOR JP-8		OBS	SERVATION	ONS
TROTERTT TESTS	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	TORUT O	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	С	C1	С	C2	С	C2				NE	NE	NE
ACID NO. mgKOH/gm	0.003	0.003	0.003	0.001	0.003	.001	.003	.003	.007			0.015	W	W	W
GUMS mg/100ml	1.4	5	13.8	0.6	6.0	4.4	4.0	9.6	8.4			7	W	W	О
HYDROPEROXIDES mM/l	0.13	0	0	0.001	ND	0	.022	0	.00				О	W	W

NOTES:

CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

Fuel Color: C = Clear C1 - C6 = Light to Dark

329

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = F

809

W = Within Allowable Requirement; O = Outside Allowable Requirement

100

OT = Material Tested Beyond Temperature Range

639

TEST MATERIAL / FUEL EXPOSURE

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

A.F. AUT. WL/POSF

S. A. ANDERSON

NE

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

248

NE

912

NE

DATE:

UDRI TECH:

UDRI P.I. ENG:

UDRI ENG:

TEST PLAN I.D. NO. II.G.15 **MATERIAL / IDENTITY:** FLUOROSILICONE/TEFLON, MIL-R-25988 TEST TEMPERATURE (°F) 200 USE: ENGINE, AIRFRAME, FUEL SYSTEM, GASKETS "O" RING 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **TEST ADDITIVE/FUEL: EXPOSURE TIME (DAYS)** 24 SEPT '96 92 POSF 2926 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

	TEST MAT	TERIAL / FUEL	EXPOSURE	TEST	Γ EVALUA	TION CRI	ΓERIA		EVA	LUATIO	N OF TE	ST R	ESUL?	ΓS
MATERIAL		RESULTS		CONTROL MAT	A	LLOWABLE	TOLERAN	ICE	COMPAR	ISON TO CO	NTROL &		OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUII	REMENT		ALLOWA	BLE REQUI	REMENTS	E	VALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	761	735	794	763	45%				0	-4	+4	W	W	W
ELONGATION (%)	107	99	107	120	35				-11	-18	-11	\mathbf{W}	W	W
VOLUME SWELL (%)	9	9	9	N/A		0		25	P	P	P	\mathbf{W}	W	W
HARD'S; a) SHORE A (PTS)	67	68	68	72	20				-5	-4	-4	\mathbf{W}	W	W
b) PENCIL														
COMP. SET (%) (avg. 2 spcm's)	18	21	15	N/A				30	P	P	P	\mathbf{W}	W	W
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														
	TEST FUE	L / MATERIAL	EXPOSURE		CONTR	OL FUEL			1					
5454.0	477.50	T' PEDIODG	20 D 4 T/C)	DDE MEM	NE DOCT (C	TDECCED) 22	FOR T DAVE		CDEC	TET CA TET CALL	ANGE	1	GENERA	_

	TEST FUEL / MATERIAL EXPOSURE 4 X 7 DAY PERIODS (28 DAYS)					CONTR	OL FUEL							
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEW)	VS. POST (ST	TRESSED) 325	5°F 7 DAYS		SPECIFICAT	TION RANGE	(GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	?-8	JP-8	+ 100	JP-8 +	100 x4	FOR	JP-8	OBS	ERVATI	ONS
	POST	POST	POST	PRE POST		PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	C1	C1	C1	С	C1	С	C2	С	C2			W	W	W
ACID NO. mgKOH/gm	.004	.002	.005	.001	.001	.001	.002	.003	.003		0.015	\mathbf{W}	W	W
GUMS mg/100ml	3.2	6.0	16.8	.6	.8	4.4	2.8	9.6	8.6		7	\mathbf{W}	W	О
HYDROPEROXIDES mM/l	0.00	0.00	0.00	.001	.002	0	.038	0	.018			\mathbf{W}	W	W
CONDUCTIVITY pS/m @72°F	122	407	653	100	66	248	131	912	410	150	600	О	W	О
VISUAL OBSERVATIONS														

DATE:

UDRI TECH:

UDRI P.I. ENG:

UDRI ENG:

24 MAR 98

J. DUES

B. WILT

NOTES:

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Not Evaluated: ND = Not Detected: **Designations:** NE =BD = Below Detection: P = Pass: F = Fail

Within Allowable Requirement; W =O = Outside Allowable Requirement

OT =**Material Tested Beyond Temperature Range**

Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration N/A =

D.H. KALT * Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: A. FLETCHER Between Material Degradation and Fuel Properties Degradation A.F. AUT. WL/POSF S. A. ANDERSON

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

FUEL / MATERIAL COMPATIBILITY TEST RESULTS TEST PLAN I.D. NO. II.G.15 **MATERIAL / IDENTITY:** FLUOROSILICONE, TEFLON, MIL-R-25988 TEST TEMPERATURE (°F) 325 USE: ENGINE, AIRFRAME, FUEL SYSTEMS GASKETS, "O" RING Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 28 **TEST ADDITIVE/FUEL: EXPOSURE TIME (DAYS)** TEST DATE START. NTP IP-8 BASELINE FUEL: 93 POSE 2980 ± (IP-8 Additives)

TEST DATE START:		NTP		JP-8 B.	ASELINE .	FUEL:	93 POS	F 2980 + (JP-8 Addit	ives)					
	TEST MAT	TERIAL / FUEL	EXPOSURE		TEST	EVALUA	TION CRI	ΓERIA		EVAI	LUATIO	N OF TE	ST R	ESUL'	ΓS
MATERIAL		RESULTS		CONTR	OL MAT	A	LLOWABLE	TOLERAN	ICE	COMPAR	ISON TO C	ONTROL &		OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	JRED AT		REQUII	REMENT		ALLOWA	BLE REQU	IREMENTS	EV	VALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIE	NT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)															
ELONGATION (%)															
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL															
COMP. SET (%) (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS	(28 DAYS)		PRE-NEW) VS. POST (S	TRESSED) 32	5°F 7 DAYS		SPECI	IFICATION	RANGE	1	GENERA	.L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	J	P-8	JP-8	+ 100	JP-8 +	- 100 x4		FOR JP-8		OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)															
ACID NO. mgKOH/gm												0.015			
GUMS mg/100ml												7		<u> </u>	
HYDROPEROXIDES mM/l															
CONDUCTIVITY pS/m @72°F										150		600			

NOTES:

VISUAL OBSERVATIONS

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Not Evaluated: ND = Not Detected: **Designations:** NE = BD = Below Detection: P = Pass: F = Fail

Within Allowable Requirement; W =O = Outside Allowable Requirement

OT =**Material Tested Beyond Temperature Range**

Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration N/A =

UDRI P.I. ENG: D.H. KALT * Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: A. FLETCHER Between Material Degradation and Fuel Properties Degradation A.F. AUT. WL/POSF S. A. ANDERSON

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

24 MAR 98

J. DUES

B. WILT

DATE:

UDRI TECH:

UDRI ENG:

TEST PLAN I.D. NO. TEST PLAN I.D. NO. TEST TEMPERATURE (°F) EXPOSURE TIME (DAYS) TEST DATE START: NTP HATERIAL COMPATIBILITY TEST RESULTS MATERIAL / IDENTITY: SELF SEALING, HOSE AIRFRAME, FUEL TRANSFER HOSE Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 + (JP-8 Additives)

TEST DATE START:		NTP		JP-8 B	ASELINE	FUEL:	93 POS	F 2980 + (JP-8 Addit	ives)				<u> </u>	
	TEST MAT	ΓERIAL / FUEL	EXPOSURE		TEST	EVALUA	TION CRIT	ΓERIA		EVA	LUATIO	N OF TE	ST R	ESUL'	<u>ΓS</u>
MATERIAL	1	RESULTS		CONTR	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	RISON TO C	ONTROL &		OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUII	REMENT		ALLOWA	ABLE REQU	IREMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	NT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)														•	
ELONGATION (%)															
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL	<u> </u>														
COMP. SET (%) (avg. 2 spcm's)															
LAP SHEAR (PSI)	1														
COHESION (%)															
TAPE ADHESION (P/F)	<u> </u>														
PEEL STRENGTH (LB/IN)	<u> </u>														
LAMINAR SHEAR (PSI)	1														
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)	<u> </u>														
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS	<u> </u>														<u> </u>
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS	(28 DAYS)		PRE-NEW	VS. POST (S	TRESSED) 32	5°F 7 DAYS		SPEC	IFICATION	RANGE	(GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	P-8	JP-8	+ 100	JP-8 +	- 100 x4	1	FOR JP-8		OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)															
ACID NO. mgKOH/gm												0.015			
GUMS mg/100ml												7			

NOTES:

HYDROPEROXIDES mM/l CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

W = Within Allowable Requirement; O = Outside Allowable Requirement

OT = Material Tested Beyond Temperature Range

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists
Between Material Degradation and Fuel Properties Degradation

DATE: 24 MAR 98
UDRI TECH: J. DUES
UDRI ENG: B. WILT
UDRI P.I. ENG: D.H. KALT
A.F. AUT. W/MLSE: A. FLETCHER
A.F. AUT. WL/POSF S. A. ANDERSON

600

150

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

TEST PLAN I.D. NO. **I.H.2 MATERIAL / IDENTITY: ACRYLIC/NITRILE, MIL-H-4495** TEST TEMPERATURE (°F) 160 USE: AIRFRAME, AERIAL REFUELING HOSE 28 **TEST ADDITIVE/FUEL:** Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** 27 APR '96 92 POSF 2926 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

	TEST MAT	TERIAL / FUEL	EXPOSURE		TEST	EVALUA	TION CRIT	ERIA		EVAL	UATIO	N OF TES	ST R	ESULT	rs
MATERIAL		RESULTS		CONTR	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPARI	ISON TO CO	ONTROL &	(OVERALI	
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIF	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	1417	NE	NE	16	84	20%				-16			W	NE	NE
ELONGATION (%)	190	NE	NE	25	50	30				-24			\mathbf{W}	NE	NE
VOLUME SWELL (%)	1	NE	NE	N.	/ A				8	P			\mathbf{W}	NE	NE
HARD'S; a) SHORE A (PTS)	63	NE	NE	6	6	12		12		-3			\mathbf{W}	NE	NE
b) PENCIL															
COMP. SET (%) (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															<u> </u>
	TEST FUEL	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEW)	VS. POST (S	TRESSED) 32	5°F 7 DAYS		SPECI	FICATION	RANGE	(GENERAI	
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	P-8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-8		OBS	SERVATIO	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	С	C1	C	C1	C	C1				NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	0.001	NE	0.001	0.002	0.003	0.003			0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	0.6	NE	4.4	5.2	9.6	12.4			7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	0.001	NE	0	0.01	0	ND				NE	NE	NE
CONDUCTIVITY pS/m @72°F	NE	NE	NE	100	NE	248	NE	912	NE	150		600	NE	NE	NE

NOTES:

VISUAL OBSERVATIONS

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: Not Evaluated: ND = Not Detected: NE =BD = Below Detection: P = Pass: F = Fail

Within Allowable Requirement; W =O = Outside Allowable Requirement

OT =**Material Tested Beyond Temperature Range**

Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration N/A =

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

DATE:

UDRI TECH:

UDRI P.I. ENG:

UDRI ENG:

A.F. AUT. W./MLSE: A. FLETCHER

A.F. AUT. WL/POSF S. A. ANDERSON

24 MAR 98

J. DUES

B. WILT

D.H. KALT

TEST EVALUATION CRITERIA

EVALUATION OF TEST RESULTS

TEST PLAN I.D. NO. **I.H.2** MATERIAL / IDENTITY: **ACRYLIC/NITRILE, MIL-H-4495** TEST TEMPERATURE (°F) 200 USE: AIRFRAME, AERIAL REFUELING HOSE 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: 92 POSF 2926 + (JP-8 Additives) **TEST DATE START:** 25 MAR 96 JP-8 BASELINE FUEL:

MATERIAL		RESULTS		CONTR	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO (CONTROL &	(OVERAL	<u></u>
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIR	REMENT		ALLOWA	BLE REQU	IREMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	844	845	964	16	84	20%				-50	-50	-43	OT	ОТ	OT
ELONGATION (%)	44	32	52	25	50	30				-82	-87	-79	OT	OT	OT
VOLUME SWELL (%)	-5	-6	-6	N.	/A				8	P	P	P	\mathbf{W}	\mathbf{W}	\mathbf{W}
HARD'S; a) SHORE A (PTS)	80	82	79	6	6	12		12		+14	+16	+13	OT	OT	OT
b) PENCIL															
COMP. SET (%) (avg. 2 spcm's)															_
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															_
VISUAL OBSERVATIONS															
	TECT EITE	L / MATERIAL	EVDOSTIDE			CONTEN	OL EUEL			1					
							OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (2			PRE-NEW)	VS. POST (S	TRESSED) 325	5°F 7 DAYS		SPECI	FICATION	RANGE	•	GENERA!	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	P-8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-		OBS	SERVATI	
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	С	C1	C	C1	C	C1				NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.001	.001	.002	.003	.003			0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	.6	.8	4.4	2.8	9.6	8.6			7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.001	.002	0	.038	0	.018				NE	NE	NE
CONDUCTIVITY pS/m @72°F	NE	NE	NE	100	66	248	131	912	410	150		600	NE	NE	NE

NOTES:

VISUAL OBSERVATIONS

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Not Evaluated: ND = Not Detected: **Designations:** NE =BD = Below Detection: P = Pass: F = Fail

W =Within Allowable Requirement; O = Outside Allowable Requirement

OT =**Material Tested Beyond Temperature Range**

TEST MATERIAL / FUEL EXPOSURE

N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

UDRI P.I. ENG: D.H. KALT * Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: A. FLETCHER Between Material Degradation and Fuel Properties Degradation A.F. AUT. WL/POSF S. A. ANDERSON

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

DATE:

UDRI TECH:

UDRI ENG:

24 MAR 98

J. DUES

B. WILT

TEST PLAN I.D. NO. I.H.3 **MATERIAL / IDENTITY:** NITRILE, MIL-H-370 200/160 TEST TEMPERATURE (°F) USE: AIRFRAME, GROUND REFUELING HOSE **TEST ADDITIVE/FUEL:** Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** 28 92 POSF 2926 + (JP-8 Additives) **TEST DATE START:** 19 MAR '96 JP-8 BASELINE FUEL:

	TEST MAT	ERIAL / FUEL	EXPOSURE		TEST	EVALUA	TION CRIT	ERIA		EVAI	LUATIO	N OF TE	ST R	ESUL	rs
MATERIAL		RESULTS		CONTR	OL MAT	AI	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	ONTROL &	(OVERAL	
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIR	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	374/1525	1189/NE	1316/NE	16	26	20%				-77/-6	-27/NE	-19/NE	OT/W	OT/NE	W/NE
ELONGATION (%)	45/216	54/NE	75/NE	30)8	30				-85/-30	-82/NE	-76/NE	OT/W	OT/NE	OT/NE
VOLUME SWELL (%)	-3/2	-3/NE	-3/NE	N.	/A				8	P/P	P/NE	P/NE	W/W	W/NE	W/NE
HARD'S; a) SHORE A (PTS)	82/66	83/NE	79/NE	6	7	12		12		+15/-1	+16/NE	+12/NE	OT/W	OT/NE	W/NE
b) PENCIL															
COMP. SET (%) (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST FUEL	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEW)	VS. POST (ST	TRESSED) 325	5°F 7 DAYS		SPECI	FICATION	RANGE		GENERA	
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JF	P-8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-8		OBS	ERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	С	C1	C	C1	С	C1				NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.001	.001	.002	.003	.003			0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	.6	.8	4.4	2.8	9.6	8.6			7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.001	.002	0	.032	0	.018				NE	NE	NE
CONDUCTIVITY pS/m @72°F	NE	NE	NE	100	66	248	131	912	410	150		600	NE	NE	NE

NOTES:

VISUAL OBSERVATIONS

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

W = Within Allowable Requirement; O = Outside Allowable Requirement

OT = Material Tested Beyond Temperature Range

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

A.F. AUT. WL/POSF

S. A. ANDERSON

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

DATE:

UDRI TECH:

UDRI P.I. ENG:

UDRI ENG:

24 MAR 98

J. DUES

B. WILT

D.H. KALT

TEST PLAN I.D. NO. **I.H.4** MATERIAL / IDENTITY: NITRILE, MIL-H-17902 TEST TEMPERATURE (°F) 200/160 USE: AIRFRAME, NAVAIR AIRCRAFT CARRIER HOSE Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** 92 POSF 2926 + (JP-8 Additives) **TEST DATE START:** 26 MAR '96 JP-8 BASELINE FUEL:

	TEST MAT	ERIAL / FUEL	EXPOSURE		TEST	EVALUA	TION CRIT	TERIA		EVAI	LUATIO	N OF TE	ST R	ESUL	rs
MATERIAL		RESULTS		CONTRO	OL MAT	AI	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	ONTROL &		OVERAL	<u> </u>
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIR	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	1612/3058	2140	2764	3458/	/3452	20%				-53/-11	-38	-20	OT/W	ОТ	W
ELONGATION (%)	112/405	149	177	53		30				-79/-24	-72	-67	OT/W	OT	OT
VOLUME SWELL (%)	-1/0	-1	-2	N	/ A				8	P/P	P	P	W/W	\mathbf{W}	\mathbf{W}
HARD'S; a) SHORE A (PTS)	76/65	75	74	6	6	12		12		+10/-1	+9	+8	W/W	\mathbf{W}	\mathbf{W}
b) PENCIL															
COMP. SET (%) (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST FUEL	/ MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEW)	VS. POST (ST	TRESSED) 325	5°F 7 DAYS		SPECI	FICATION	RANGE	(GENERA	
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JP	- -8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-8		OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	C	C1	C	C1	С	C1				NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.001	.001	.002	.003	.003			0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	.6	.2	4.4	2.8	9.6	8.6			7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.001	.002	0	.032	0	.018				NE	NE	NE
CONDUCTIVITY pS/m @72°F	NE	NE	NE	100	66	248	131	912	410	150		600	NE	NE	NE

NOTES:

VISUAL OBSERVATIONS

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

W = Within Allowable Requirement; O = Outside Allowable Requirement

OT = Material Tested Beyond Temperature Range

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

A.F. AUT. WL/POSF

S. A. ANDERSON

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

DATE:

UDRI TECH:

UDRI P.I. ENG:

UDRI ENG:

24 MAR 98

J. DUES

B. WILT

D.H. KALT

TEST PLAN I.D. NO. I.H.5 **MATERIAL / IDENTITY:** EPICHLOROHYDRIN, MIL-H-26521 TEST TEMPERATURE (°F) 200 USE: AIRFRAME, GROUND REFUELING HOSE 28 **TEST ADDITIVE/FUEL:** Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** 92 POSF 2926 + (JP-8 Additives) **TEST DATE START:** 20 MAR '96 JP-8 BASELINE FUEL:

	TEST MAT	TERIAL / FUEL	EXPOSURE		TEST	EVALUA	TION CRIT	ERIA		EVAL	LUATIO	N OF TE	ST R	ESULT	ΓS
MATERIAL		RESULTS		CONTRO	OL MAT	AI	LOWABLE	TOLERAN	CE	COMPARI	ISON TO CO	NTROL &	(OVERAL	
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIR	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	685	1591	1516	18	06	20%				-62	-12	-16	OT	W	W
ELONGATION (%)	274	416	408	53	38	30				-49	-23	-24	OT	\mathbf{W}	W
VOLUME SWELL (%)	7	6	6	N/	/A				8	P	P	P	\mathbf{W}	\mathbf{W}	W
HARD'S; a) SHORE A (PTS) b) PENCIL	51	56	56	6	2	12		12		-11	-6	-6	W	W	W
COMP. SET (%) (avg. 2 spcm's) LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST FUEL	L / MATERIAL	EXPOSURE			CONTRO	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEW)	VS. POST (ST	TRESSED) 325	5°F 7 DAYS		SPECI	FICATION 1	RANGE	(GENERA	
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JP	- -8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-8		OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	С	C1	C	C1	C	C1				NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.001	.001	.002	.003	.003			0.015	NE	NE	NE

4.4

0

248

2.8

.032

131

9.6

0

912

8.6

.018

410

NOTES:

GUMS mg/100ml

HYDROPEROXIDES mM/l

CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

Fuel Color: C = Clear C1 - C6 = Light to Dark

NE

NE

NE

NE

NE

NE

W = Within Allowable Requirement; O = Outside Allowable Requirement

OT = Material Tested Beyond Temperature Range

NE

NE

NE

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

DATE: 24 MAR 98
UDRI TECH: J. DUES
UDRI ENG: B. WILT
UDRI P.I. ENG: D.H. KALT
A.F. AUT. W/MLSE: A. FLETCHER
A.F. AUT. WL/POSF S. A. ANDERSON

150

7

600

NE

NE

NE

NE

NE

NE

NE

NE

NE

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

.8

.002

66

.6

.001

100

TEST EVALUATION CRITERIA

TEST PLAN I.D. NO. I.I. 1 **MATERIAL / IDENTITY:** TFE (TEFLON) TEST TEMPERATURE (°F) 200 USE: AIRFRAME, INSULATION/ELECTRICAL/WIER/CLAMPS/MISC 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: 23 FEB '95 93 POSF 2980 **TEST DATE START:** JP-8 BASELINE FUEL: + (JP-8 Additives)

MATERIAL		RESULTS		CONTRO	OL MAT	AI	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	NTROL &		OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIR	EMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	1960	1934	1951	19	37	20%				+1	0	+1	W	W	W
ELONGATION (%)	146	154	143	20)8	30				-30	-26	-31	\mathbf{W}	\mathbf{W}	W
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST FUEL	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
								· - · ·							
FUELS		Y PERIODS (/				STRESSED) °I			SPECI	FICATION 1	RANGE		GENERA!	
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)		- -8		+ 100	JP-8 +			FOR JP-8			SERVATI	
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	C	C1	C	C1	C	C1				NE	NE	NE
ACID NO. mgKOH/gm	.004	.003	.005	.001	.002	.001	.002	.003	.003			0.015	\mathbf{W}	\mathbf{W}	\mathbf{W}
GUMS mg/100ml	1.4	4.8	5.8	2	4.8	4.4	2.8	9.6	8.6			7	W	\mathbf{W}	W
HYDROPEROXIDES Mm/l	.018	.096	NE	.004	.037	0	.032	0	.018				0	О	NE

NOTES:

CONDUCTIVITY Ps/m @72°F

VISUAL OBSERVATIONS

Fuel Color: C = Clear C1 - C6 = Light to Dark

449

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = F

852

W = Within Allowable Requirement; O = Outside Allowable Requirement

108

OT = Material Tested Beyond Temperature Range N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

644

TEST MATERIAL / FUEL EXPOSURE

Between Material Degradation and Fuel Properties Degradation

DATE: 24 MAR 98

UDRI TECH: J. DUES

UDRI ENG: B. WILT

UDRI P.I. ENG: D.H. KALT

A.F. AUT. W./MLSE: A. FLETCHER

A.F. AUT. WL/POSF S. A. ANDERSON

150

600

 \mathbf{W}

0

 \mathbf{o}

EVALUATION OF TEST RESULTS

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

39

248

131

912

410

TEST EVALUATION CRITERIA

EVALUATION OF TEST RESULTS

150

600

24 MAR 98

J. DUES

B. WILT

0

 \mathbf{W}

 \mathbf{W}

TEST PLAN I.D. NO. I.I. 2 **MATERIAL / IDENTITY:** NYLON (OLD), ASTM D 4066 TEST TEMPERATURE (°F) 160 USE: AIRFRAME, INSULATION/ELECTRICAL/WIRE/CLAMPS/MISC 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: 27 DEC '95 **TEST DATE START:** JP-8 BASELINE FUEL: 92 POSF 2926 + (JP-8 Additives)

	-				11231	LVALUA	HON CKI	LIXIA		LVAI	JUAII	IN OF IE	31 V	ESUL!	19
MATERIAL		RESULTS		CONTRO	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO C	CONTROL &	(OVERALI	
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIR	REMENT		ALLOWA	BLE REQU	IREMENTS	EV	VALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	Т ТЕМР	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	12244	11980	11071	109	92	20%				+11	-9	+1	W	W	W
ELONGATION (%)	97	131	159	37	' 6	10				-74	-65	-58	О	\mathbf{W}	\mathbf{W}
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	W) VS. POST (STRESSED) °I	F 7 DAYS		SPECI	FICATION	RANGE	1 (GENERAI	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JP	-8	IP-8	+ 100	IP-8 +	100 x4	1	FOR JP-8	2	ORS	SERVATION	ONS
TROTERTT TESTS	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	IONUT	MAX	JP8	+100	X4
COLOR (7 DAYS)	C1	CC2	C2	С	C1	С	C1	С	C1				W	W	W
ACID NO. mgKOH/gm	.003	.003	.004	0.001	NE	.001	0.002	.003	0.003			0.015	W	W	W
GUMS mg/100ml	1.0	5.0	13.0	0.6	NE	4.4	5.2	9.6	12.4			7	W	W	0
HYDROPEROXIDES Mm/l	NE	NE	NE	0.001	NE	0	0.01	0	ND				NE	NE	NE

NOTES:

CONDUCTIVITY Ps/m @72°F

VISUAL OBSERVATIONS

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

141

Not Evaluated: ND = Not Detected: **Designations:** NE =BD = Below Detection: P = Pass:

162

W =Within Allowable Requirement; O = Outside Allowable Requirement

100

OT =**Material Tested Beyond Temperature Range**

410

TEST MATERIAL / FUEL EXPOSURE

N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

D.H. KALT * Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: A. FLETCHER **Between Material Degradation and Fuel Properties Degradation** A.F. AUT. WL/POSF S. A. ANDERSON

NE

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

248

NE

912

NE

DATE:

UDRI TECH:

UDRI P.I. ENG:

UDRI ENG:

TEST EVALUATION CRITERIA

EVALUATION OF TEST RESULTS

NE

 \mathbf{W}

600

23 MAR 98

J. DUES

B. WILT

D.H. KALT

NE

 \mathbf{W}

NE

0

TEST PLAN I.D. NO. I.I. 2 **MATERIAL / IDENTITY:** NYLON (OLD), ASTM D 4066 TEST TEMPERATURE (°F) 200 USE: AIRFRAME, INSULATION/ELECTRICAL/WIRE/CLAMPS/MISC 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: 27 DEC '95 **TEST DATE START:** JP-8 BASELINE FUEL: 92 POSF 2926 + (JP-8 Additives)

MATERIAL		RESULTS		CONTR	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	IS ON TO CO	ONTROL &	(OVERALI	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIE	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	NT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	12600	11862	12534	109	992	20%				+15	+8	+14	W	W	W
ELONGATION (%)	39	58	86	37	76	10				-90	-85	-77	О	0	О
VOLUME SWELL (%)															1
HARD'S; a) SHORE A (PTS)															
b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															1
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															1
LAMINAR SHEAR (PSI)															1
RESISTIVITY (OHM-CM)															1
TORQUE (INCH -LBS.)															1
RUPTURE PRESS. (IN.HG)															<u> </u>
VISUAL OBSERVATIONS															1
	TECT FILE	L / MATERIAL	EVDOCUDE			CONTEN	OF EVEL			li	•				
							OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	W) VS. POST ((STRESSED) °	F 7 DAYS		SPECI	IFICATION 1	RANGE	(GENERAI	i.
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JF	P-8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-8		OBS	ERVATIO	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	C1	C2	C2	С	C1	С	C1	С	C1				W	W	W
ACID NO. mgKOH/gm	.003	.003	.004	.001	.001	.001	.002	.003	.003			0.015	\mathbf{W}	\mathbf{W}	\mathbf{W}
GUMS mg/100ml	NE	NE	NE	.6	.8	4.4	2.8	9.6	8.6			7	NE	NE	NE
HIVE DODE DOWNER				004	000		0.00	_	0.4.0						

0

248

.032

131

0

912

.018

410

DATE:

UDRI TECH:

UDRI P.I. ENG:

UDRI ENG:

150

NOTES:

HYDROPEROXIDES mM/l

CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

Fuel Color: C = Clear C1 - C6 = Light to Dark

NE

155

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fa

NE

623

W = Within Allowable Requirement; O = Outside Allowable Requirement

OT = Material Tested Beyond Temperature Range

NE

371

TEST MATERIAL / FUEL EXPOSURE

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

A.F. AUT. WL/POSF

S. A. ANDERSON

.001

100

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

.002

66

TEST PLAN I.D. NO. I.I. 2 **MATERIAL / IDENTITY:** NYLON, ASTM D 4066 (NEW) TEST TEMPERATURE (°F) 200 USE: AIRFRAME, FUEL SYSTEM CLAMPS, WIRE INSULATION 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: 92 POSF 2926 **TEST DATE START:** 25 JAN 96 JP-8 BASELINE FUEL: + (JP-8 Additives)

	TEST MAT	TERIAL / FUEL	EXPOSURE		TEST	EVALUAT	TION CRIT	ERIA		EVAI	LUATIO	N OF TE	ST R	ESUL ⁷	ΓS
MATERIAL		RESULTS		CONTR	OL MAT	AI	LOWABLE	TOLERAN	CE		ISON TO CO			OVERAL	
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REOUIF	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	NT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	9138	12116	10510	110	680	20				-22%	+4%	-10%	О	W	W
ELONGATION (%)	84	172	148	38	80	10				-78%	-55%	-61%	О	W	W
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST FUE	L / MATERIAL	EXPOSURE			CONTRO	OL FUEL			1					_
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	V) VS. POST (F 7 DAYS		SPECI	FICATION 1	RANGE		GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	PRE-NI .IP-8		JP-8	+ 100	JP-8 +	100 x4	1	FOR JP-8		OBS	SERVATI	ONS
TROTERTT TEOTO	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)				С	C1	С	C1	С	C1						
ACID NO. mgKOH/gm				.001	.001	.001	.002	.003	.003			0.015			
GUMS mg/100ml				.6	.8	4.4	2.8	9.6	8.6			7			1

0

248

.032

131

0

912

.018

410

DATE:

UDRI TECH:

UDRI P.I. ENG:

UDRI ENG:

150

600

24 MAR 98

J. DUES

B. WILT

D.H. KALT

NOTES:

HYDROPEROXIDES mM/l

CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: Not Evaluated: ND = Not Detected: NE =BD = Below Detection: P = Pass: F = Fail

W =Within Allowable Requirement; O = Outside Allowable Requirement

OT =**Material Tested Beyond Temperature Range**

Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration N/A =

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

.001

100

A.F. AUT. W./MLSE: A. FLETCHER A.F. AUT. WL/POSF S. A. ANDERSON

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

.002

66

TEST EVALUATION ODITEDIA

EXALUATION OF TECT DECIL TO

0.015

7

600

24 MAR 98

J. DUES

B. WILT

D.H. KALT

 \mathbf{W}

W

0

 \mathbf{W}

 \mathbf{w}

W

0

0

W

0

NE

0

TEST PLAN I.D. NO. I.I. 3 **MATERIAL / IDENTITY:** POLYETHYLENE (HDP) TEST TEMPERATURE (°F) 200 USE: AIRFRAME, INSULATION/ELECTRICAL WIRE/CLAMPS/MISC 28 **TEST ADDITIVE/FUEL:** Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** 21 FEB '95 93 POSF 2980 **TEST DATE START:** JP-8 BASELINE FUEL: + (JP-8 Additives)

	IESI MAI	IERIAL / FUEL	EAPOSURE		TEST	EVALUA	TION CRIT	ERIA		EVAI	LUATIO	N OF TE	ST R	ESULT	<u>rs</u>
MATERIAL		RESULTS		CONTR	OL MAT	AI	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	NTROL &	•	OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIF	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	3097	3104	3072	45	54	20%				-32	-32	-33	0	W	W
ELONGATION (%)	172	215	194	3	9	10				+341	+451	+397	\mathbf{W}	\mathbf{W}	W
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	W) VS. POST (STRESSED) °	F 7 DAYS		SPECI	FICATION I	RANGE		GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	.TT.	P-8	JP-8	+ 100	.IP-8 +	100 x4		FOR JP-8			SERVATI	
7. 10. 2.1. 7 72373	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	101101	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	С	C1	С	C1	С	C1				NE	NE	NE

.001

4.4

0

248

.002

2.8

.032

131

.003

9.6

0

912

.003

8.6

.018

410

DATE:

UDRI TECH:

UDRI P.I. ENG:

UDRI ENG:

150

NOTES:

ACID NO. mgKOH/gm

HYDROPEROXIDES mM/l

CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

GUMS mg/100ml

Fuel Color: C = Clear C1 - C6 = Light to Dark

.001

2.4

.025

444

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

.003

11.6

NE

857

W = Within Allowable Requirement; O = Outside Allowable Requirement

.001

2

.004

108

OT = Material Tested Beyond Temperature Range

.001

5.0

.297

617

TEST MATERIAL / FUEL EXPOSURE

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

A.F. AUT. W./MLSE

A.F. AUT. W./POSF

S. A. ANDERSON

.002

4.8

.037

39

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

TEST EVALUATION CRITERIA

EVALUATION OF TEST RESULTS

TEST PLAN I.D. NO. I.I. 4 **MATERIAL / IDENTITY:** KAPTON UPILEX TEST TEMPERATURE (°F) 200 USE: AIRFRAME, INSULATION/ELECTRICAL WIRE/CLAMPS/MISC 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: 28 JUN '96 **TEST DATE START:** JP-8 BASELINE FUEL: 92 POSF 2926 + (JP-8 Additives)

	-				11231	LVALUA	HON CKI	LIXIA		EVAL	JUAII	ON OF IE	31 K	ESUL!	19
MATERIAL		RESULTS		CONTR	OL MAT	A.	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO	CONTROL &	(OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIR	REMENT		ALLOWA	BLE REQ	UIREMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	NT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	15973	15947	15360	16	107	20%				-1	-1	-5	W	W	W
ELONGATION (%)	50	53	42	4	6	10				+9	+24	-9	W	W	W
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL														1	
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)														1	
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST FILE	L / MATERIAL	EVDOCUDE	l		CONTED	OL FUEL			11					
							OL FUEL								
FUELS		Y PERIODS (,		PRE-NEV	W) VS. POST	(STRESSED) °	F 7 DAYS		SPECI	FICATIO	N RANGE	(GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	2-8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-		OBS	SERVATI	
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	C	C1	С	C1	С	C1				NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.001	.001	.002	.003	.003			0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	.6	.8	4.4	2.8	9.6	8.6			7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.001	.002	0	.032	0	.018				NE	NE	NE
CONDUCTIVITY pS/m @72°F	NE	NE	NE	100	66	248	131	912	410	150		600	NE	NE	NE

NOTES:

VISUAL OBSERVATIONS

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Not Evaluated: ND = Not Detected: **Designations:** NE =BD = Below Detection: P = Pass: F = Fail

W =Within Allowable Requirement; O = Outside Allowable Requirement

OT =**Material Tested Beyond Temperature Range**

TEST MATERIAL / FUEL EXPOSURE

N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

D.H. KALT * Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: A. FLETCHER Between Material Degradation and Fuel Properties Degradation A.F. AUT. WL/POSF S. A. ANDERSON

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

DATE:

UDRI TECH:

UDRI P.I. ENG:

UDRI ENG:

24 MAR 98

J. DUES

B. WILT

TEST PLAN I.D. NO. I.I. 6 **MATERIAL / IDENTITY:** VINYL PLASTIC TUBING,MIL-I-7444D TEST TEMPERATURE (°F) 200/160 USE: AIRFRAME, FUEL SYSTEM, FUEL TANK Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** 11 JULY 97 92POSF 2926 **TEST DATE START:** JP-8 BASELINE FUEL: + (JP-8 Additives)

	TEST MAT	ERIAL / FUEL	EXPOSURE	TEST	EVALUA'	TION CRIT	ERIA		EVAI	LUATION	OF TES	ST RE	SUL	ΓS
MATERIAL		RESULTS		CONTROL MAT	AI	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	NTROL &	O.	VERAL	Ĺ
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUIR	REMENT		ALLOWA	BLE REQUI	REMENTS	EVA	LUATI	ON
(AVG. 5 SPECIMENS)	POST 200/160	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8 200/160	JP-8+100	JP-8+100x4	JP8 200/160	+100	X4
TENSILE (PSI)	2663/2130	2736	2820	1981	15				+34/+8	+38	+42	O/W	W	W
ELONGATION (%)	51/166	84	29	399	15				-87/-58	-79	-93	O/O	О	О
VOLUME SWELL (%)	-16/-11	-17	-17	N/A	N/A									<u> </u>
HARD'S; a) SHORE A (PTS)	100	100	100	65	N/A				+35	+35	+35	\mathbf{W}	\mathbf{W}	\mathbf{W}
b) PENCIL														
COMP. SET (avg. 2 spcm's)														1
LAP SHEAR (PSI)														ł
COHESION (%)														1
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														1
RESISTIVITY (OHM-CM)														1
TORQUE (INCH -LBS.)														1
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														<u> </u>

	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL							
FUELS	4 X 7 DA	Y PERIODS	(28 DAYS)		PRE-NEV	W) VS. POST (STRESSED) °1	F 7 DAYS		SPECIFICAT	TION RANGE	G	ENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JP-8 PRE POST		JP-8	+ 100	JP-8 +	100 x4	FOR	JP-8	OBSI	ERVATI	ONS
	POST	POST	POST	PRE	PRE POST		POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)				С	C1	С	C1	С	C1					
ACID NO. mgKOH/gm				.001	.001	.001	.002	.003	.003		0.015			1
GUMS mg/100ml				.6	.8	4.4	2.8	9.6	8.6		7			1
HYDROPEROXIDES mM/l				.001	.002	0	.032	0	.018					
CONDUCTIVITY pS/m @72°F				100	66	248	131	912	410	150	600			1
VISUAL OBSERVATIONS														1

NOTES:

C1 - C6 = Light to Dark **Fuel Color:** $\mathbf{C} =$ Clear

Designations: NE = Not Evaluated; ND = Not Detected; **BD** = **Below Detection**; **P** = **Pass**; **F** = **Fail**

W =Within Allowable Requirement; O = Outside Allowable Requirement OT =**Material Tested Beyond Temperature Range**

Not applicable: N/A =NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

DATE: 24 MAR 98 UDRI TECH: J. DUES **UDRI ENG:** B. WILT UDRI P.I. ENG: D.H. KALT A.F. AUT. W./MLSE: __A. FLETCHER

A.F. AUT. WL/POSF S. A. ANDERSON

Between Material Degradation and Fuel Properties Degradation

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

TEST PLAN I.D. NO.	I.I. 7	MATERIAL / IDENTITY:	KYNAR, FUEL LINE CLAMPS, ETC.
TEST TEMPERATURE (°F)	200	USE:	AIRFRAME, FUEL TANKS
EXPOSURE TIME (DAYS)	28	TEST ADDITIVE/FUEL:	Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980
TEST DATE START:	11 JULY 97	JP-8 BASELINE FUEL:	92 POSF 2926 + (JP-8 Additives)

	TEST MAT	TERIAL / FUEL	EXPOSURE		TEST	EVALUA	TION CRIT	TERIA		EVAI	LUATIO	N OF TE	ST R	ESUL ?	ΓS
MATERIAL	1	RESULTS		CONTR	OL MAT	AI	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	NTROL &	(OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIE	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	NT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)															
ELONGATION (%)	<u> </u>														
VOLUME SWELL (%)	0	0	0	N	/A					P	P	P	\mathbf{W}	\mathbf{W}	\mathbf{W}
HARD'S; a) SHORE A (PTS)	92	95	95	9	00					P	P	P	\mathbf{W}	W	\mathbf{W}
b) PENCIL	1														
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)	1													•	
COHESION (%)															
TAPE ADHESION (P/F)	1														
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS	(28 DAYS)		PRE-NEV	W) VS. POST (F 7 DAYS		SPEC	IFICATION 1	RANGE		GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	J	P-8	JP-8	+ 100	JP-8 +	100 x4	1	FOR JP-8		OBS	SERVATION	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)				С	C1	С	C1	С	C1						
ACID NO. mgKOH/gm				.001	.001	.001	.002	.003	.003			0.015			
GUMS mg/100ml				.6	.8	4.4	2.8	9.6	8.6			7			

0

248

.032

131

0

912

.018

410

DATE:

UDRI TECH:

UDRI P.I. ENG:

UDRI ENG:

150

600

24 MAR 98

J. DUES

B. WILT

D.H. KALT

NOTES:

HYDROPEROXIDES mM/l

CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

W = Within Allowable Requirement; O = Outside Allowable Requirement

.001

100

OT = Material Tested Beyond Temperature Range

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

A.F. AUT. WL/POSF

S. A. ANDERSON

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

.002

66

TEST PLAN I.D. NO. I.I. 8/I.B.11.14 **MATERIAL / IDENTITY:** NYLON TEST TEMPERATURE (°F) 200 USE: AIRFRAME, FUEL SYSTEM BLADDER TANK STRUCURAL 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL:** TEST DATE START: See I.B.II-14 92 POSF 2926 + (JP-8 Additives) JP-8 BASELINE FUEL:

TEST DATE START:	See	1.B.II-14		JP-8 B	ASELINE .	ruel:	92 POS	F 2920 +	(JP-8 Addi	uves)					
	TEST MAT	TERIAL / FUEL	EXPOSURE		TEST	ΓEVALUA	TION CRI	ΓERIA		EVAI	LUATIO	N OF TE	ST R	ESULT	rs -
MATERIAL		RESULTS		CONTR	OL MAT	A	LLOWABLE	E TOLERAN	ICE	COMPAR	ISON TO CO	ONTROL &	(OVERALI	<u>. </u>
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	JRED AT		REQUII	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIE	NT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)															
ELONGATION (%)															
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
													П		
FUELS	4 X 7 DA	Y PERIODS (,		PRE-NE	W) VS. POST	(STRESSED) °	F 7 DAYS		SPECI	IFICATION :	RANGE	•	GENERAI	Ĺ
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	J]	P-8	JP-8	+100	JP-8 +	+ 100 x4		FOR JP-8		OBS	SERVATIO	
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)															
ACID NO. mgKOH/gm												0.015			
GUMS mg/100ml												7			
HYDROPEROXIDES mM/l															

NOTES:

CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

W = Within Allowable Requirement; O = Outside Allowable Requirement

OT = Material Tested Beyond Temperature Range

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation DATE: 24 MAR 98
UDRI TECH: J. DUES
UDRI ENG: B. WILT
UDRI P.I. ENG: D.H. KALT

150

A.F. AUT. W./MLSE: A. FLETCHER
A.F. AUT. WL/POSF S. A. ANDERSON

600

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

TEST PLAN I.D. NO. I.I.9 **MATERIAL / IDENTITY:** MAGNETIC WIRE, INSULATION TYPE I HML VARNISH TEST TEMPERATURE (°F) 325 USE: AIRFRAME / ENGINE, JOINING MATERIAL **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980

TEST DATE START: 2 Dec '97 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST M	ATERIAL	FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	3		
MATERIAL PROPERTY TESTS	.11.	·-8	RESU	-	.IP8+1	00 (X4)	OBSERVATIONS AND REFERENCES		OVERALI /ALUATI	
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST	OBSERVATIONS AND REFERENCES	JP8	+100	X4
COLOR	L	L2	L	L2	L	L2	Varnish Present All Samples	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	.0921	.0922	.0828	.0830	.0966	.0967				
GAIN / LOSS (gms)		+0001		+0002		+0001		CN	W	W
MICROSCOPY EVAL.										

FUELS	T	EST FUE		ERIAL E		RE	P		CONTRO S. POST (STR		YS @ 200°I	7)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*				`	,		JI	2-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATION	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C1	C2	C1	C2	C1	C2	C	C2	C	C2	С	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	283	9	382	71	616	315	50	4	300	57	569	150/600		0	0	0
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ C1 - C6 = Light to Dark Clear

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

W = **Comparisons:** Within Allowable Requirement;

DATE: 24 MAR 98 OT = Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME N/A =Not applicable; CN = ControlUTC ENG: J. LEONE

UDRI P.I. ENG: GT =Greater than 500 ppb LT = Less than 500 ppbD.H. KALT NSR =No Spec. Req. and/or 4 (x) Additive Concentration A.F. AUT. W./MLSA: L. PERKINS

A.F. AUT. WL/POSF S. A. ANDERSON_

TEST PLAN I.D. NO. I.I. 10 **MATERIAL / IDENTITY:** TEFLON / KAPTON (COMPOSITE) TEST METHOD SA 4373 TEST TEMPERATURE (°F) 200 **USE:** AIRFRAME, FUEL TANK, WIRE, INSULATED ELECTRICAL 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /92 POSF 2926 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL:** 11 SEP 97 92 POSF 2926 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

	TEST MAT	TERIAL / FUEL	EXPOSURE	TEST	EVALUA	TION CRIT	ERIA		EVA	LUATIO	N OF TE	ST R	ESULT	rs
MATERIAL		RESULTS		CONTROL MAT	A	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	NTROL &	(OVERALI	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUIE	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)														
ELONGATION (%)													i	
VOLUME SWELL (%)													<u> </u>	
HARD'S; a) SHORE A (PTS)													i	
b) PENCIL													<u> </u>	
COMP. SET (avg. 2 spcm's)													<u> </u>	
LAP SHEAR (PSI)													· 	
COHESION (%)														
TAPE ADHESION (P/F)													1	
PEEL STRENGTH (LB/IN)													<u> </u>	
LAMINAR SHEAR (PSI)													· 	
RESISTIVITY (OHM-CM)													<u> </u>	
TORQUE (INCH -LBS.)													· 	
RUPTURE PRESS. (IN.HG)													<u> </u>	
WET DIELECTRIC(mA)	350	450	350	<300					P	P	P	W	W	W
	TEST FUE	L / MATERIAL	EXPOSURE		CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)	PRE-NE	W) VS. POST	(STRESSED) °	F 7 DAYS		SPEC	IFICATION I	RANGE		GENERAI	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JP-8	JP-8	+ 100	JP-8 +	- 100 x4		FOR JP-8		OBS	SERVATIO	ONS
	DOCT	DOCT	DOCT	DDE DOGE	DDE	DOCT		DOCT	MIN		MAY	TDO	100	37.4

	TEST FUEL	L / MATERIAL	EXPOSURE			CONTR	OL FUEL							
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	V) VS. POST (STRESSED) °1	F 7 DAYS		SPECIFICAT	TION RANGE		GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR	JP-8	OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)				С	C1	С	C1	С	C1					
ACID NO. mgKOH/gm				.001	.001	.001	.002	.003	.003		0.015			
GUMS mg/100ml				.6	.8	4.4	2.8	9.6	8.6		7			
HYDROPEROXIDES mM/l				.001	.002	0	.032	0	.018					
CONDUCTIVITY pS/m @72°F				100	66	248	131	912	410	150	600			
VISUAL OBSERVATIONS														

DATE:

UDRI TECH:

UDRI ENG:

24 MAR 98

J. DUES

B. WILT

NOTES:

C1 - C6 = Light to Dark Fuel Color: $\mathbf{C} =$ Clear

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

W =Within Allowable Requirement; O = Outside Allowable Requirement OT =**Material Tested Beyond Temperature Range**

N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive ConcentrationUDRI P.I. ENG:

D.H. KALT * Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: __A. FLETCHER Between Material Degradation and Fuel Properties Degradation A.F. AUT. WL/POSF S. A. ANDERSON

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

I.I. 12 **MATERIAL / IDENTITY: TEFLON / WIRE TEST METHOD SA 4373** TEST PLAN I.D. NO. 200 AIRFRAME, FUEL TANK, WIRE, INSULATED ELECTRICAL TEST TEMPERATURE (°F) USE: EXPOSURE TIME (DAYS) 28 **TEST ADDITIVE/FUEL:** Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /92 POSF 2926 11 SEP 97 92 POSF 2926 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

	TEST MAT	ERIAL / FUEL	EXPOSURE	TEST	EVALUA	TION CRIT	TERIA		EVAI	LUATION	OF TES	ST R	ESULT	rs
MATERIAL		RESULTS		CONTROL MAT	AI	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	NTROL &	(OVERALI	Ĺ
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUIF	REMENT		ALLOWA	BLE REQUIE	REMENTS	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)														
ELONGATION (%)														
VOLUME SWELL (%)														
HARD'S; a) SHORE A (PTS)														
b) PENCIL														
COMP. SET (avg. 2 spcm's)														
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)													<u> </u>	
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)													<u> </u>	
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
WET DIELECTRIC(mA)	<300	<300	<300	<300					P	P	P	\mathbf{W}	W	W
		•		-		•	•				•			

	TEST FUEL	L / MATERIAL	EXPOSURE			CONTR	OL FUEL							
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	W) VS. POST (STRESSED) °I	7 DAYS		SPECIFICAT	TION RANGE	(GENERAI	
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	J	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR	JP-8	OBS	SERVATION	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)				С	C1	С	C1	С	C1					
ACID NO. mgKOH/gm				.001	.001	.001	.002	.003	.003		0.015			
GUMS mg/100ml				.6	.8	4.4	2.8	9.6	8.6		7			
HYDROPEROXIDES mM/l				.001	.002	0	.032	0	.018					
CONDUCTIVITY pS/m @72°F				100	66	248	131	912	410	150	600			
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: $\mathbf{C} =$ C1 - C6 = Light to Dark Clear

Designations: NE =

N/A =

Not Evaluated; ND = Not Detected; Within Allowable Requirement; **W** =

BD = Below Detection; P = Pass; F = FailO = Outside Allowable Requirement

DATE: 24 MAR 98 UDRI TECH: J. DUES UDRI ENG: B. WILT

Material Tested Beyond Temperature Range OT =

NSR = No Spec. Req. and/or 4 (x) Additive Concentration

UDRI P.I. ENG: D.H. KALT A.F. AUT. W./MLSE: A. FLETCHER A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. I.I. 13 **MATERIAL / IDENTITY:** NYLON / WIRE, COAX SHEILD (mA) TEST TEMPERATURE (°F) 200 **USE:** AIRFRAME, FUEL TANK WIRE, INSULATE, ELECTRICAL EXPOSURE TIME (DAYS) 28 TEST ADDITIVE/FUEL: Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /92POSF 2926 TEST DATE START: 11 SEP 97 JP-8 BASELINE FUEL: 92POSF 2926 + (JP-8 Additives)

	TEST MA	TERIAL / FUEL	EXPOSURE		TEST	EVALUA	TION CRIT	TERIA		EVAI	LUATIO	N OF TE	ST R	ESUL '	ΓS
MATERIAL		RESULTS		CONTR	OL MAT	AI	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	NTROL &	(OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIF	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	NT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)															
ELONGATION (%)															
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)														1	
b) PENCIL															
COMP. SET (avg. 2 spcm's)														1	
LAP SHEAR (PSI)															
COHESION (%)														1	
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)														1	
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)														1	
TORQUE (INCH -LBS.)														1	
RUPTURE PRESS. (IN.HG)														<u> </u>	
WET DIELECTRIC(mA)	<300	<300	<300	<3	300					P	P	P	W	W	W
	TEST FUE	L / MATERIAL	EXPOSURE			CONTRO	OL FUEL								
FUELS	4 X 7 DA	AY PERIODS	(28 DAYS)		PRE-NEV	W) VS. POST (STRESSED) °	F 7 DAYS		SPECI	IFICATION I	RANGE		GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	P-8	JP-8	+ 100	.IP-8 +	100 x4	1	FOR JP-8		OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)				С	C1	С	C1	С	C1						
ACID NO. mgKOH/gm				.001	.001	.001	.002	.003	.003			0.015			
GUMS mg/100ml				.6	.8	4.4	2.8	9.6	8.6			7			

NOTES:

HYDROPEROXIDES mM/l CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected;
W = Within Allowable Requirement;

 $BD = Below \ Detection; \quad P = Pass; \quad F = Fail \ O = Outside Allowable Requirement$

0

248

.032

131

0

912

.018

410

150

J. DUES
B. WILT
D.H. KALT

600

OT = Material Tested Beyond Temperature Range N/A = Not applicable; NSR = No Spec. Req. a

NSR = No Spec. Req. and/or 4 (x) Additive Concentration

.001

100

UDRI P.I. ENG:
A.F. AUT. W./MLSE:
A.F. AUT. WL/POSF
S. A. ANDERSON

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

.002

66

TEST PLAN I.D. NO. I.I. 13.1 **MATERIAL / IDENTITY:** NYLON / WIRE, COAX CENTER (mA) TEST TEMPERATURE (°F) 200 **USE:** AIRFRAME, FUEL TANK WIRE, INSULATE, ELECTRICAL EXPOSURE TIME (DAYS) 28 TEST ADDITIVE/FUEL: Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /92POSF 2926 TEST DATE START: 11 SEP 97 JP-8 BASELINE FUEL: 92POSF 2926 + (JP-8 Additives)

	TEST MAT	TERIAL / FUEL	EXPOSURE		TEST	EVALUA	TION CRIT	TERIA		EVAI	LUATIO	N OF TE	ST R	ESUL'	ΓS
MATERIAL		RESULTS		CONTR	OL MAT	AI	LOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	ONTROL &	(OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIF	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	NT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)															
ELONGATION (%)															
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
WET DIELECTRIC(mA)	<400	<400	<400	<4	100					P	P	P	W	W	W
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS ((28 DAYS)		PRE-NEV	W) VS. POST (STRESSED) °	F 7 DAYS		SPECI	IFICATION	RANGE	(GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	P-8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-8		OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOD (ZDAVC)				C	C1	C	C1	C	C1						$\overline{}$

	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL							
FUELS	4 X 7 DA	Y PERIODS	(28 DAYS)		PRE-NEV	W) VS. POST	(STRESSED) o	F 7 DAYS		SPECIFICA	TION RANGE		GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	J]	P-8	JP-8	+ 100	JP-8 +	100 x4	FOF	R JP-8	OB	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)				С	C1	С	C1	С	C1					
ACID NO. mgKOH/gm				.001	.001	.001	.002	.003	.003		0.015			
GUMS mg/100ml				.6	.8	4.4	2.8	9.6	8.6		7			
HYDROPEROXIDES mM/l				.001	.002	0	.032	0	.018					
CONDUCTIVITY pS/m @72°F				100	66	248	131	912	410	150	600			
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: C = C1 - C6 = Light to Dark Clear

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = FailDATE: W =Within Allowable Requirement; O = Outside Allowable Requirement UDRI TECH:

OT =**Material Tested Beyond Temperature Range**

Not applicable: N/A =NSR = No Spec. Req. and/or 4 (x) Additive Concentration UDRI P.I. ENG: D.H. KALT A.F. AUT. W./MLSE: A. FLETCHER

24 MAR 98

J. DUES

B. WILT

UDRI ENG:

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

A.F. AUT. WL/POSF _S. A. ANDERSON Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

TEST PLAN I.D. NO. I.J.I **MATERIAL / IDENTITY:** 2219-T87 ALUMINUM, WELDED UNS A 92319/419ID (AMS) TEST TEMPERATURE (°F) 200 USE: AIRFRAME / ENGINE, JOINING MATERIAL

Betz Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** 28 TEST ADDITIVE/FUEL:

TEST DATE START: 5 DEC '96 JP-8 BASELINE FUEL: 93 POSF 2926 + (JP-8 Additives)

		TEST M	ATERIAL /	FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	3		
MATERIAL			RESU	JLTS				(OVERAL	L
PROPERTY TESTS	JP	2-8	JP-8	+100	JP8+10	00 (X4)	OBSERVATIONS AND REFERENCES	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L1	L	L1	L	L1	Minimum Discoloration / Deposits All Samples	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	6.7790	6.7775	6.5744	6.5740	6.8447	6.8445				
GAIN / LOSS (gms)		0005		0004		0002		CN	W	W
MICROSCOPY EVAL.										

FUELC	T	EST FUE				RE			CONTRO S. POST (STR	_	VC @ 2000	7)	SPEC.		T RESU	
FUELS PROPERTY TESTS*		4 X 7 1	DAY PER	IODS (28 I	JAYS)			2-8	JP-8		1	100 x4	RANGE FOR JP-8		GENERAI SERVATIO	
PROPERTY 12313	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C1	C1	C1	C1	C1	C1	С	C1	C	С	С	С	IVELLE	W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	254	96	584	448	904	863	298	90	257	233	608	272	150/600	W	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	ND	NE	ND	NE	ND	NE		NE		NE			NE	NE	NE
	NE	50	NE	50	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

W = **Comparisons:** Within Allowable Requirement;

DATE: 24 APR 98 OT = Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE

UDRI P.I. ENG: GT =Greater than 500 ppb LT = Less than 500 ppbD.H. KALT NSR = No Spec. Req. and/or 4 (x) Additive Concentration A.F. AUT. W./MLSA: L. PERKINS A.F. AUT. WL/POSF S. A. ANDERSON_

TEST PLAN I.D. NO. **MATERIAL / IDENTITY:** 6 AL-4V (Ti) WELDED MATCH FILL **I.J.2** TEST TEMPERATURE (°F) 325 USE: AIRFRAME / ENGINE, JOINING MATERIAL

EXPOSURE TIME (DAYS) 28 TEST ADDITIVE/FUEL: Betz Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980

TEST DATE START: 1 NOV '95 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST M	ATERIAL /	FUEL EXF	OSURE		EVALUATION OF TEST RESULTS	8		
MATERIAL		. 0	RESU	-	TD0 14	00 (\$7.4)			OVERAL	
PROPERTY TESTS	JP	-8	JP-8	+100	JP8+10	00 (X4)	OBSERVATIONS AND REFERENCES	EV	VALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L	L	L	L	L	DISCOLORATION ON JP-8 SAMPLE / SURFACE DEPOSITS – ALL SAMPLES	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P	MINIMUM PITTING – ALL SAMPLES	CN	W	W
AVG. WT. (gms)	9.1543	9.1545	9.1827	9.1827	9.1595	9.1593				
GAIN / LOSS (gms)		+0002		0000		0002		CN	W	W
MICROSCOPY EVAL.										

FUELS	T			ERIAL E IODS (28 D		RE	р		CONTRO S. POST (STR	_	VS @ 200°F	o o	SPEC. RANGE		ST RESU GENERA	
PROPERTY TESTS*		42.71	DALLEN	10D3 (20 L	JA15)			2-8	JP-8			100 x4	FOR JP-8		SERVATION TO SERVA	
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C1	C4	C1	C4	C1	C4	С	C2	C	C2	C	C2		0	0	0
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	121	41	327	105	572	389	108	123	248	141	912	555	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Ti	7	7	10	14	10	7	NE		NE		NE			NE	NE	NE
Al	40	NE	50	NE	70	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ C1 - C6 = Light to Dark Clear

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

W = **Comparisons:** Within Allowable Requirement;

DATE: 24 APR 98 OT = Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE

UDRI P.I. ENG: GT =Greater than 500 ppb LT = Less than 500 ppbD.H. KALT NSR =

No Spec. Req. and/or 4 (x) Additive Concentration A.F. AUT. W./MLSA: L. PERKINS A.F. AUT. WL/POSF S. A. ANDERSON_

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists **Between Material Degradation and Fuel Properties Degradation**

TEST PLAN I.D. NO. **I.J.3** MATERIAL / IDENTITY: 3AL-2.5SV (Ti), WELDED, MATCH FILL TEST TEMPERATURE (°F) 325 AIRFRAME / ENGINE, JOINING MATERIAL USE: 28 Betz Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: TEST DATE START: 14 MAR '96 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST M	ATERIAL /	FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	5		
MATERIAL			RESU	JLTS				(OVERAL	L
PROPERTY TESTS	JP	-8	JP-8	+100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L2	L	L1	L	L1	Discoloration JP-8 Samples only	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	9.7992	9.7991	9.8102	9.8102	9.7585	9.7584				
GAIN / LOSS (gms)		+0005		+0004		+0002		CN	W	W
MICROSCOPY EVAL.										

_	_															
FUELS	T	-		ERIAL E IODS (28 I		RE	P	PRE (NEW) V	CONTRO S. POST (STE		YS @ 200°I	7)	SPEC. RANGE		ST RESU GENERAL	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	SERVATIO	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	С3	C4	С3	C4	С3	C4	С	C2	C	C2	С	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	104	42	434	96	789	356	108	38	248	131	912	410	150/600	0	W	0
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	11	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	ND	NE	ND	NE	ND	NE	NE		NE		NE			NE	NE	NE
	ND	NE	ND	NE	ND	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

P = Pitting**Designations:** NE =Not Evaluated; ND = Not Detected; BD = Below Detection

Comparisons: W = Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

J. LEONE N/A =Not applicable; CN = ControlUTC ENG: Greater than 500 ppb LT = Less than 500 ppbGT =**UDRI P.I. ENG:** D.H. KALT

NSR =No Spec. Req. and/or 4 (x) Additive Concentration A.F. AUT. W./MLSA: L. PERKINS A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. **I.J.4 MATERIAL / IDENTITY:** INCO 718 NICKEL, WELDED MATCH FILL TEST TEMPERATURE (°F) 200 AIRFRAME / ENGINE, JOINING MATERIAL USE: 28 Betz Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: TEST DATE START: 10 MAY 95 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST M	IATERIAL /	FUEL EXP	POSURE		EVALUATION OF TEST RESULTS	5		
MATERIAL			RESU	JLTS				(OVERAL	L
PROPERTY TESTS	JP-8 JP-8+100 JP8+100 (X4) PRE POST PRE POST PRE PO						OBSERVATIONS AND REFERENCES	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L1	L	L1	L	L1		CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	18.0334	18.0336	17.8698	17.8717	18.0578	18.0579				
GAIN / LOSS (gms)		+.0002		+.0019		+.0001		CN	W	W
MICROSCOPY EVAL.										

FUELS	T	-		ERIAL E IODS (28 D		RE	P		CONTRO S. POST (STR	_	YS @ 200°I	·")	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	SERVATION	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C1	C1	C1	C1	C1	C1	С	C2	C	C2	C	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	147	60	300	345	572	533	108	38	248	131	912	410	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	ND	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

P = Pitting**Designations:** NE =Not Evaluated; ND = Not Detected; BD = Below Detection

Comparisons: W = Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

J. LEONE N/A =Not applicable; CN = ControlUTC ENG: Greater than 500 ppb LT = Less than 500 ppbGT =**UDRI P.I. ENG:** D.H. KALT NSR =No Spec. Req. and/or 4 (x) Additive Concentration A.F. AUT. W./MLSA: L. PERKINS

S. A. ANDERSON

A.F. AUT. WL/POSF

TEST PLAN I.D. NO. **I.J.4 MATERIAL / IDENTITY:** INCO 718 NICKEL, WELDED, MATCH FILL TEST TEMPERATURE (°F) 325 AIRFRAME / ENGINE, JOINING MATERIAL USE: 28 Betz Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: TEST DATE START: 10 MAY '95 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST M	ATERIAL /	FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	5		
MATERIAL			RESU	JLTS				•	OVERAL	L
PROPERTY TESTS	JP-8 JP-8 +100 JP8+100 (X4) PRE POST PRE POST I PRE PRE PRE PRE					00 (X4)	OBSERVATIONS AND REFERENCES	EV	ALUATION	ON
(AVG. 5 SPECIMENS)	PRE POST PRE POST PRE POST L L2 L L2 L L2					POST		JP8	+100	X4
COLOR	L	L2	L	L2	L	L2	Discoloration / Deposits All Samples	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	18.1786	18.1790	18.1780	18.1784	17.9868	17.9869				
GAIN / LOSS (gms)		00004		00004		00001		CN	W	W
MICROSCOPY EVAL.										

FUELS	T	-		ERIAL E IODS (28 I		RE	P	PRE (NEW) V	CONTRO S. POST (STE		YS @ 200°I	?)	SPEC. RANGE		ST RESU GENERAL	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	SERVATIO	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	С3	C4	С3	C4	С3	C3	С	C2	С	C2	C	C2		О	0	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	135	33	257	51	481	201	108	123	248	141	912	555	150/600	0	0	0
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

P = Pitting**Designations:** NE =Not Evaluated; ND = Not Detected; BD = Below Detection

Comparisons: W = Within Allowable Requirement; DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

> J. LEONE N/A =Not applicable; CN = ControlUTC ENG: Greater than 500 ppb LT = Less than 500 ppbGT =**UDRI P.I. ENG:** D.H. KALT

NSR =No Spec. Req. and/or 4 (x) Additive Concentration A.F. AUT. W./MLSA: L. PERKINS A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. **I.J.5 MATERIAL / IDENTITY:** INCO 625 NICKEL, WELDED, MATCH FILL TEST TEMPERATURE (°F) 325 AIRFRAME / ENGINE, JOINING MATERIAL USE: 28 Betz Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: TEST DATE START: 5 DEC '96 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST M	IATERIAL ,	FUEL EXI	POSURE		EVALUATION OF TEST RESULTS	5		
MATERIAL			RESU	JLTS				(OVERAL	L
PROPERTY TESTS	JP	JP-8 JP-8 +100 JP8+100 (X4) PRE POST PRE POST PRE POST PRE POST					OBSERVATIONS AND REFERENCES	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	PRE POST PRE POST PRE POST L L2 L L2 L L2				POST		JP8	+100	X4
COLOR	L	L2	L	L2	L	L2	Discoloration All Samples	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	18.2886	18.2883	18.0096	18.0091	18.1323	18.1322				
GAIN / LOSS (gms)		0003		0005		0001		CN	W	W
MICROSCOPY EVAL.										

		-				-										
FUELS	T	-		ERIAL E IODS (28 D		RE	P	PRE (NEW) V	CONTRO S. POST (STR	_	YS @ 200°I	?)	SPEC. RANGE		ST RESU GENERAI	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	- 100 x4	FOR JP-8	OBS	SERVATIO	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C5	C2	C4	C1	C2	С	C2	С	C2	C	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	186	125	506	212	898	1270	50	4	300	57	569	241	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Ni	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
Fe	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
Al	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

P = Pitting**Designations:** NE =Not Evaluated; ND = Not Detected; BD = Below Detection

Comparisons: W = Within Allowable Requirement;

DATE: OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:**

CN = ControlJ. LEONE N/A =Not applicable; UTC ENG: Greater than 500 ppb LT = Less than 500 ppbGT =**UDRI P.I. ENG:** D.H. KALT

24 APR 98

A. BEHME

NSR =No Spec. Req. and/or 4 (x) Additive Concentration A.F. AUT. W./MLSA: L. PERKINS A.F. AUT. WL/POSF S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. **I.J.6 MATERIAL / IDENTITY:** 321 S.S. (FERROUS) WELDED, MATCH FILL TEST TEMPERATURE (°F) 200 AIRFRAME / ENGINE, JOINING MATERIAL USE: 28 Betz Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: TEST DATE START: 10 MAY '95 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST M	ATERIAL /	FUEL EXF	POSURE		EVALUATION OF TEST RESULTS	,		
MATERIAL			RESU	JLTS				(OVERALI	Ĺ
PROPERTY TESTS	JP-8 JP-8 +100 JP8+100 (X4) PRE POST PRE POST PRE POST PRE POST					00 (X4)	OBSERVATIONS AND REFERENCES	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L2	L	L2	L	L2	Discoloration / Deposits All Samples	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	17.5551	17.5551	17.5494	17.5496	17.4211	17.4211				
GAIN / LOSS (gms)		.0000		+.0002		.0000		CN	W	W
MICROSCOPY EVAL.										

FUELS	T	EST FUE 4 X 7		ERIAL E		RE	P		CONTRO S. POST (STR	_	YS @ 200°F	()	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	SERVATION	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C1	C1	C1	C1	C1	C1	С	C1	С	C1	С	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	146	60	304	235	568	439	108	39	248	131	912	410	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

P = Pitting**Designations:** NE =Not Evaluated; ND = Not Detected; BD = Below Detection

Comparisons: W = Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME J. LEONE N/A =Not applicable; CN = ControlUTC ENG:

Greater than 500 ppb LT = Less than 500 ppbGT =**UDRI P.I. ENG:** D.H. KALT NSR =No Spec. Req. and/or 4 (x) Additive Concentration A.F. AUT. W./MLSA: L. PERKINS

A.F. AUT. WL/POSF S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. **I.J.6 MATERIAL / IDENTITY:** 321 S.S. (FERROUS) WELDED, MATCH FILL AIRFRAME / ENGINE, JOINING MATERIAL TEST TEMPERATURE (°F) 325 USE: **EXPOSURE TIME (DAYS)** 28 TEST ADDITIVE/FUEL: Betz Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **TEST DATE START:** 10 MAY '95 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST M	ATERIAL /	FUEL EXF	OSURE		EVALUATION OF TEST RESULTS	5		
MATERIAL PROPERTY TESTS	JP	-8	RESU JP-8	-	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES		OVERALI ALUATIO	
(AVG. 5 SPECIMENS)	PRE					POST	OBSERVATIONS AND REPERENCES	JP8	+100	X4
COLOR	L	L2	L	L2	L	L2	DISCOLORATION/DEPOSITS ALL SAMPLES	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	17.5519	17.5514	17.4950	17.4921	17.6291	17.6291				
GAIN / LOSS (gms)		.0005		+.0029		.0000		CN	W	W
MICROSCOPY EVAL.										

FUELS	T	EST FUE		ERIAL E IODS (28 I		RE	P	PRE (NEW) V	CONTRO S. POST (STR		YS @ 200°I	· ()	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	SERVATIO	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C4	C2	C4	C2	C4	С	C2	С	C2	С	C2		0	О	0
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	152	34	295	200	559	290	108	123	248	141	912	555	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement;

> OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME N/A =Not applicable; CN = ControlUTC ENG: J. LEONE D.H. KALT

GT =Greater than 500 ppb LT = Less than 500 ppb**UDRI P.I. ENG:** NSR =No Spec. Req. and/or 4 (x) Additive Concentration A.F. AUT. W./MLSA:

L. PERKINS A.F. AUT. WL/POSF S. A. ANDERSON

DATE:

24 APR 98

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. **I.J.7 MATERIAL / IDENTITY:** IN 200 / 201 NICKEL, WELDED, MATCH FILL AIRFRAME / ENGINE, JOINING MATERIAL TEST TEMPERATURE (°F) 325 USE: **EXPOSURE TIME (DAYS)** 28 TEST ADDITIVE/FUEL: Betz Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **TEST DATE START:** 4 OCT 95 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST M	IATERIAL /	FUEL EXF	POSURE		EVALUATION OF TEST RESULTS	5		
MATERIAL			RESU	JLTS				(OVERALI	L
PROPERTY TESTS					JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	EV	VALUATIO	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L2	L	L2	L	L2	Discoloration All Samples	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	19.6198	19.6195	19.4001	19.3993	19.8395	19.8389				
GAIN / LOSS (gms)		0003		0008		0006		CN	W	W
MICROSCOPY EVAL.										

FUELS	T	EST FUE		ERIAL E IODS (28 I		RE	P	PRE (NEW) V	CONTRO S. POST (STR	_	YS @ 200°I	?)	SPEC. RANGE		ST RESU GENERA	
PROPERTY TESTS*							JP-8 JP-8 +			+ 100	JP-8 +	100 x4	FOR JP-8	OBS	SERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2		С3		C4		С	C2	С	C2	С	C2		W	W	О
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	127	36	347	168	584	440	108	123	248	141	912	555	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	120	950	610	1350	1110	1620	NE		NE		NE			NE	NE	NE
	1	1	2	1	3	2	NE		NE		NE			NE	NE	NE
	25	10	60	55	135	65	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRITECH:** A. BEHME N/A =Not applicable; CN = ControlUTC ENG: J. LEONE GT =**UDRI P.I. ENG:** D.H. KALT

Greater than 500 ppb LT = Less than 500 ppbNSR =No Spec. Req. and/or 4 (x) Additive Concentration

A.F. AUT. W./MLSA: L. PERKINS A.F. AUT. WL/POSF S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. **I.J.8 MATERIAL / IDENTITY:** IN 200 / 201, WELDED BNI (5 OR 6) TEST TEMPERATURE (°F) 325 JOINING MATERIAL USE: **EXPOSURE TIME (DAYS)** 29 TEST ADDITIVE/FUEL: Betz Dearborn 8Q462 (Normal and x4 93 POSF 2980) 5 DEC '96 **TEST DATE START:** JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST M	ATERIAL /	FUEL EXP	OSURE		EVALUATION OF TEST RESULTS								
MATERIAL	RESULTS							OVERALL							
PROPERTY TESTS	JP	-8	JP-8	+100	JP8+10	00 (X4)	OBSERVATIONS AND REFERENCES	EV	ALUATIO	ON					
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4					
COLOR	L	L2	L	L2	L	L2	Discoloration / Deposits All Samples	CN	W	W					
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W					
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W					
AVG. WT. (gms)	18,1840	18.1830	17.8898	17.8889	17.8250	17.8235									
GAIN / LOSS (gms)		0010		0009		0015		CN	W	W					
MICROSCOPY EVAL.															

FUELS	T	EST FUE 4 X 7		ERIAL E IODS (28 I		RE	P		CONTRO S. POST (STR	_	YS @ 200°I	7)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JP-8 JI		JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBSERVATIONS		
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C5	C2	C5	C2	C2	С	C2	С	C2	С	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	234	108	582	189	889	1431	50	4	300	57	569	241	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY		1							1	
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME N/A =Not applicable; CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppbUDRI P.I. ENG: D.H. KALT NSR =No Spec. Req. and/or 4 (x) Additive Concentration A.F. AUT. W./MLSA: L. PERKINS

A.F. AUT. WL/POSF

S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. **I.J.9 MATERIAL / IDENTITY:** WASPALOY (NI), BRAZED AMS 4786 Au TEST TEMPERATURE (°F) 325 **USE:** AIRFRAME, ENGINE JOINING MATERIAL

28 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: Betz Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** 5 DEC '96 JP-8 BASELINE FUEL:

		TEST M	ATERIAL /	FUEL EXF	POSURE		EVALUATION OF TEST RESULTS							
MATERIAL			RESU	JLTS				(OVERAL	L				
PROPERTY TESTS	JP	-8	JP-8	+100	JP8+10	00 (X4)	OBSERVATIONS AND REFERENCES	EV	ALUATIO	ON				
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4				
COLOR	L	L1	L	L1	L	L1	MINIMUM DISCOLORATION AND DEPOSITS ALL SAMPLES	CN	W	W				
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W				
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W				
AVG. WT. (gms)	17.4513	17.4452	17.6879	17.6793	17.5065	17.4976								
GAIN / LOSS (g ms)		.0061		0086		0089		CN	W	W				
MICROSCOPY EVAL.														

FUELS	T	EST FUE 4 X 7		ERIAL E IODS (28 I		RE	P	PRE (NEW) V	CONTRO S. POST (STR	_	YS @ 200°I	?)	SPEC. RANGE		TEST RESULTS GENERAL		
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	- 100 x4	FOR JP-8	OBSERVAT		ONS	
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4	
COLOR (7 DAYS)	C2	C4	C5	C5	C2	C4	С	C2	С	C2	С	C2					
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST											
PS/M AT 72° F	215	45	425	87	682	315	50	4	300	57	569	241	150/600				
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY											
	20	NE	70	NE	100	NE	NE		NE		NE			NE	NE	NE	
	ND	NE	30	NE	50	NE	NE		NE		NE			NE	NE	NE	
	110	NE	100	NE	80	NE	NE		NE		NE			NE	NE	NE	
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE	

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L=

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement; DATE: _24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement UDRI TECH:

A. BEHME N/A =Not applicable; CN = ControlUTC ENG: J. LEONE GT =Greater than 500 ppb LT = Less than 500 ppb**UDRI P.I. ENG:** D.H. KALT

NSR =No Spec. Req. and/or 4 (x) Additive Concentration A.F. AUT. W./MLSA: L. PERKINS A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. 321 STAINLESS STEEL BRAZED, B Ag 5 I.J.10 **MATERIAL / IDENTITY:** TEST TEMPERATURE (°F) 325 **ENGINE FUEL LINES & COMPONENTS** USE:

28 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: Betz Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980

TEST DATE START: 13 FEB 97 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST M	IATERIAL /	FUEL EXP	POSURE		EVALUATION OF TEST RESULTS											
MATERIAL			RESU	JLTS										(OVERAL			
PROPERTY TESTS	JF	P-8	JP-8	+100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES								EVALUATION			
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST							JP8	+100	X4			
COLOR	L	L2	L	L1	L	L1								CN	W	W		
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND								CN	W	W		
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND								CN	W	W		
AVG. WT. (gms)	16.0113	16.0098	16.6320	16.6303	16.4479	16.4463												
GAIN / LOSS (gms)		0015		0017		0016								CN	W	W		
MICROSCOPY EVAL.											_							
									CONTROL FUEL SPEC.									
	T	EST FUE				RE	_								T RESU			
FUELS	T			ERIAL E IODS (28 I		RE	P	RE (NEW) V		L FUEL RESSED 7 DA	YS @ 200°I	?)	SPEC. RANGE		T RESU GENERA			
FUELS PROPERTY TESTS*	T					RE		RE (NEW) V		RESSED 7 DA	1	7) - 100 x4						
	7					28			S. POST (STR	RESSED 7 DA	1		RANGE		GENERA			
		4 X 7		IODS (28 I			J	2-8	S. POST (STR JP-8	RESSED 7 DA + 100	JP-8 +	100 x4	RANGE FOR JP-8 MIN /	OBS	GENERA SERVATIO	ONS		
PROPERTY TESTS*	7	4 X 7 1	DAY PER	ODS (28 I	DAYS)	28	PRE	P-8 POST	S. POST (STR JP-8 PRE	+ 100 POST	JP-8 + PRE	- 100 x4 POST	RANGE FOR JP-8 MIN /	OBS JP8	GENERA SERVATIO +100	ONS X4		
PROPERTY TESTS* COLOR (7 DAYS)	7 C3	28 C3	7 C3	28 C3	7 C2	28 C3	PRE	P-8 POST	S. POST (STR JP-8 PRE	+ 100 POST	JP-8 + PRE	- 100 x4 POST	RANGE FOR JP-8 MIN /	OBS JP8	GENERA SERVATIO +100	ONS X4		
PROPERTY TESTS* COLOR (7 DAYS) CONDUCTIVITY (AVG. of 4)	7 C3 PRE	28 C3 POST	7 C3 PRE	28 C3 POST	OAYS) 7 C2 PRE	28 C3 POST	PRE C	P-8 POST C2	S. POST (STR JP-8 PRE C	POST C2	JP-8 + PRE	- 100 x4 POST C2	RANGE FOR JP-8 MIN / MAX	OBS JP8	GENERA GERVATIO +100 W	DNS X4 W		

NE

NE

NE

NOTES:

Metallic Color: L1 - L2 = Discoloration/Deposits Light (No Deposit) $\mathbf{L} =$

<100

<100

NE

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

<100

<100

NE

<100

<100

NE

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

<100

<100

NE

<100

<100

NE

<100

<100

NE

Comparisons: W =Within Allowable Requirement;

OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME Not applicable; CN = Control N/A =UTC ENG: J. LEONE GT =Greater than 500 ppb LT = Less than 500 ppb**UDRI P.I. ENG:** D.H. KALT

NE

NE

NE

NE

NE

NE

DATE:

A.F. AUT. WL/POSF

NE

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24 APR 98

NE

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NE

NE

NE

NE

NSR = No Spec. Req. and/or 4 (x) Additive Concentration A.F. AUT. W./MLSA: L. PERKINS S. A. ANDERSON

TEST PLAN I.D. NO. I.J.11 **MATERIAL / IDENTITY:** B-36 21A QQ-S-571 Sn 60, Pb 40 SOLDER SPOTS TEST TEMPERATURE (°F) 200 **USE:** JOINING MATERIAL Betz Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** 28 TEST ADDITIVE/FUEL: **TEST DATE START:** 13 FEB 97 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST M	ATERIAL /	FUEL EXP	OSURE		EVALUATION OF TEST RESULTS)		
MATERIAL			RESU	-				•	OVERAL	L
PROPERTY TESTS	JP	-8	JP-8	+100	JP8+10	00 (X4)	OBSERVATIONS AND REFERENCES	EV	ALUATION	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L1	L	L1	L	L1	Discoloration / Deposits All Samples	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	8.0805	8.0800	8.0956	8.0908	8.1084	8.0867				
GAIN / LOSS (gms)		0005		0044		0217		CN	W	W
MICROSCOPY EVAL.										

FUELS	T	-		ERIAL E IODS (28 D		RE	P		CONTRO S. POST (STR	_	YS @ 200°I	?)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	SERVATION	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	С3	C2	С3	С3	С3	C2	С	C1	С	C1	C	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	153	103	468	408	696	1073	50	4	300	57	569	241	150/600	0	0	0
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L = Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W = Within Allowable Requirement;

OT = Material Tested Beyond Temperature Range O = Outside Allowable Requirement UDRI TECH:

N/A = Not applicable; CN = Control UTC ENG:

J. LEONE

GT = Greater than 500 ppb LT = Less than 500 ppb UDRI P.I. ENG: D.H. KALT

NSR = No Spec. Req. and/or 4 (x) Additive Concentration

A.F. AUT. W./MLSA: L. PERKINS

DATE:

A.F. AUT. WL/POSF

24 MAR 98

S. A. ANDERSON

TEST PLAN I.D. NO. **MATERIAL / IDENTITY:** B36 21A COPPER(W), QQ-S-571, SN60,Pb40, SOLDER SPOTS I.J.11 AIRFRAME / ENGINE, JOINING MATERIAL TEST TEMPERATURE (°F) 325 USE: **EXPOSURE TIME (DAYS)** 28 TEST ADDITIVE/FUEL: Betz Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **TEST DATE START:** 19 JAN 96 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST M	ATERIAL /	FUEL EXI	POSURE		EVALUATION OF TEST RESULTS	5		
MATERIAL PROPERTY TESTS	JP	-8		JLTS +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES		OVERALI ALUATIO	
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L1	L	L1	L	L1		CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND	Lead Rich Banding Near Interface of Solder and Base Metal – Tested Above Temp.	OT	OT	ОТ
AVG. WT. (gms)	8.0787	8.0687	8.0476	8.0397	7.9830	7.9749	Range for 60 Sn / 40 Pb Solder / Retest at Lower Temp. (200F)			
GAIN / LOSS (gms)		0100		0079		0081		OT	OT	OT
MICROSCOPY EVAL.										

FUELS	TI	EST FUE		ERIAL E IODS (28 I		RE	P		CONTRO S. POST (STR		YS @ 200°I	()	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	SERVATION	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	С3	C4	С3	C4	С3	C4	С	C1	C	C1	C	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	103	13	481	77	745	327	108	123	248	141	912	555	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	350	305	2220	2950	4700	3300	NE		NE		NE			W	0	0
	40	80	40	90	38	85	NE		NE		NE			W	W	W
	ND	ND	ND	ND	ND	ND	NE		NE		NE			W	W	W
	15	16	100	72	367	63	NE		NE		NE			W	W	W

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** _A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE Greater than 500 ppb GT =LT = Less than 500 ppb**UDRI P.I. ENG:** D.H. KALT No Spec. Req. and/or 4 (x) Additive Concentration NSR =A.F. AUT. W./MLSA: L. PERKINS

A.F. AUT. WL/POSF S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. I.J.12 MATERIAL / IDENTITY: 6061 T6 DIP BRAZE, GRADE B, TYPE V MIL-B-7883

TEST TEMPERATURE (°F) 200 USE: JOINING MATERIAL

EXPOSURE TIME (DAYS) 28 TEST ADDITIVE/FUEL: Betz Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980

TEST DATE START: 13 FEB 97 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST M	IATERIAL .	FUEL EXP	OSURE				EVA	LUATI	ION O	F TEST	RESULTS	}		
MATERIAL			RESU	JLTS										(OVERAL	L
PROPERTY TESTS	JP	2-8	JP-8	+100	JP8+1	00 (X4)		OBSER	RVATIO	VS AND	REF	ERENC	E S	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST								JP8	+100	X4
COLOR	L	L1	L	L1	L	L1								CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND								CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND								CN	W	W
AVG. WT. (gms)	6.0071	6.0072	5.9853	5.9853	6.0621	6.0620										
GAIN / LOSS (gms)		+.0001		.0000		0001								CN	W	W
MICROSCOPY EVAL.					_											
	T	EST FUE	L / MATI	ERIAL E	XPOSUR	RE			CONTRO	_			SPEC.	TES	T RESU	LTS
FUELS		4 X 7	DAY PER	IODS (28 I	DAYS)		P	RE (NEW) V	S. POST (STR	ESSED 7 DA	YS @ 200°I	3)	RANGE	•	GENERA	L
PROPERTY TESTS*							JI	P-8	JP-8 +	- 100	JP-8 +	100 x4	FOR JP-8	OBS	SERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN /	JP8	+100	X4
													MAX	1	1	1

FUELS		4 X 7	DAY PER	IODS (28 I	DAYS)		P	PRE (NEW) V	S. POST (STR	RESSED 7 DA	YS @ 200°I	3)	RANGE	•	GENERAL	Ĺ
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	SERVATIO	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C2	C1	C1	C1	C1	С	C2	С	C2	С	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	241	144	421	342	694	573	50	4	300	57	569	241	150/600	0	0	0
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L = Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W = Within Allowable Requirement; DATE: 24 MAR 98
OT = Material Tested Beyond Temperature Range O = Outside Allowable Requirement UDRI TECH: A. BEHME

OT = Material Tested Beyond Temperature Range O = Outside Allowable Requirement
N/A = Not applicable; ON = Control UDRI TECH:

ON = Outside Allowable Requirement
UTC ENG:

J. LEONE

GT = Greater than 500 ppb LT = Less than 500 ppb UDRI P.I. ENG: D.H. KALT

NSR = No Spec. Req. and/or 4 (x) Additive Concentration

A.F. AUT. W./MLSA: L. PERKINS

A.F. AUT. WL/POSF S. A. ANDERSON

^{*} Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. I.J.13 **MATERIAL / IDENTITY:** Ti, Cu, Ni, BRAZE

TEST TEMPERATURE (°F) 325 AIRFRAME / ENGINE, JOINING MATERIAL USE: **EXPOSURE TIME (DAYS)** 28 TEST ADDITIVE/FUEL: Betz Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980

TEST DATE START: 18 OCT 95 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST M	IATERIAL .	FUEL EXP	POSURE		EVALUATION OF	TEST RE	SULTS			
MATERIAL			RESU	JLTS						(OVERAL	L
PROPERTY TESTS	JF	-8	JP-8	+100	JP8+1	00 (X4)	OBSERVATIONS AND REFE	RENCES		EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		-		JP8	+100	X4
COLOR	L	L	L	L	L	L	Minimum Surface Deposits All Samples			CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND				CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND				CN	W	W
AVG. WT. (gms)	11.3084	11.3086	11.3231	11.3231	11.3304	11.3304						
GAIN / LOSS (gms)		+.0002		.0000		.0000				CN	W	W
MICROSCOPY EVAL.												
	T	EST FUE	L / MATI	ERIAL E	XPOSUR	EE	CONTROL FUEL	S	SPEC.	TES	T RESU	LTS
FUELS		4 X 7	DAY PER	IODS (28 I	DAYS)		PRE (NEW) VS. POST (STRESSED 7 DAYS @ 200°F)) R A	ANGE	(GENERA	L
DDODEDTV TESTS*							IP-8 IP-8 + 100 IP-8 + 1	100 v4 FO	D ID-8	ORS	FDVATI	ONG

FUELS	T	EST FUE 4 X 7		ERIAL E IODS (28 I		RE	P		CONTRO S. POST (STR	_	YS @ 200°I	?)	SPEC. RANGE		ST RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	SERVATION	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C1	C2	C1	C2	C1	C2	C	C2	C	C2	С	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	83	7	530	245	417	526	108	123	248	141	912	555	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	ND	15	ND	15	ND	32	NE		NE		NE			NE	NE	NE
	4	7	18	20	32	11	NE		NE		NE			NE	NE	NE
	10	ND	17	2	19	40	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement; OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement

UDRI TECH: A. BEHME Not applicable; CN = Control N/A =UTC ENG: J. LEONE GT =Greater than 500 ppb LT = Less than 500 ppb**UDRI P.I. ENG:** D.H. KALT A.F. AUT. W./MLSA: L. PERKINS

DATE:

A.F. AUT. WL/POSF

_24 APR 98

S. A. ANDERSON

NSR =No Spec. Req. and/or 4 (x) Additive Concentration

TEST PLAN I.D. NO. 6061-T6 ALUMINUM, WELDED with 4043 FILLER I.J.14 MATERIAL / IDENTITY:

TEST TEMPERATURE (°F) 200 AIRFRAME / ENGINE, JOINING MATERIAL USE:

EXPOSURE TIME (DAYS) 28 TEST ADDITIVE/FUEL: Betz Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980

TEST DATE START: 5 DEC '96 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST M	ATERIAL /	FUEL EXP	OSURE				EVA	LUATI	ON O	F TEST	RESULTS	5		
MATERIAL			RESU	JLTS										(OVERALI	L
PROPERTY TESTS	JF	'-8	JP-8	+100	JP8+1	00 (X4)		OBSER	RVATIO	NS AND	REFE	ERENC	E S	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST								JP8	+100	X4
COLOR	L	L1	L	L1	L	L1	Surface De	posits All San	ıples					CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND								CN	W	W
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P	Minimum	Pitting All Sa	mples					CN	W	W
AVG. WT. (gms)	5.9033	5.9028	5.8586	5.8583	5.9602	5.9608										
GAIN / LOSS (gms)		0005		0003		+.0006								CN	W	W
MICROSCOPY EVAL.																
	Т	EST FUE	I. / MATI	ERIAL E	YPOSIIR	F			CONTRO	L FUEL			SPEC.	TEC	T DECL	I TC
													or Ec.	H.5		
FUELS				ODS (28 I			P	RE (NEW) V	S. POST (STR		YS @ 200°F	")	RANGE		T RESU GENERAI	
FUELS PROPERTY TESTS*						Œ		P-8		ESSED 7 DA		7) 100 x4		(L
	7					28		(,	S. POST (STR	ESSED 7 DA		<i>′</i>	RANGE	(GENERAL	L
	7	4 X 7		ODS (28 I			J	P-8	S. POST (STR JP-8	EESSED 7 DA + 100	JP-8 +	100 x4	RANGE FOR JP-8	OBS	GENERAI ERVATIO	L ONS
	7 C1	4 X 7		ODS (28 I			J	P-8	S. POST (STR JP-8	EESSED 7 DA + 100	JP-8 +	100 x4	RANGE FOR JP-8 MIN /	OBS	GENERAI ERVATIO	L ONS
PROPERTY TESTS*	7	4 X 7 1	DAY PER	ODS (28 I	PAYS) 7	28	PRE	P-8 POST	S. POST (STR JP-8 - PRE	EESSED 7 DA + 100 POST	JP-8 + PRE	100 x4 POST	RANGE FOR JP-8 MIN /	OBS JP8	SENERAI ERVATIO +100	L ONS X4
PROPERTY TESTS* COLOR (7 DAYS)	7 C1	28 C1	7 C1	28 C1	7 C1	28 C1	PRE	P-8 POST	S. POST (STR JP-8 - PRE	EESSED 7 DA + 100 POST	JP-8 + PRE	100 x4 POST	RANGE FOR JP-8 MIN /	OBS JP8	SENERAI ERVATIO +100	L ONS X4

NE

NE

NE

NE

NOTES:

Metallic Color: L1 - L2 = Discoloration/Deposits Light (No Deposit) $\mathbf{L} =$

NE

NE

NE

NE

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

NE

NE

NE

NE

NE

NE

NE

NE

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

NE

Comparisons: W =Within Allowable Requirement;

Material Tested Beyond Temperature Range A. BEHME OT =O = Outside Allowable Requirement **UDRI TECH:** Not applicable; CN = ControlN/A =UTC ENG: J. LEONE GT =Greater than 500 ppb LT = Less than 500 ppb**UDRI P.I. ENG:** D.H. KALT A.F. AUT. W./MLSA: L. PERKINS

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DATE:

A.F. AUT. WL/POSF

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24 APR 98

S. A. ANDERSON

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NSR = No Spec. Req. and/or 4 (x) Additive Concentration

TEST PLAN I.D. NO. **MATERIAL / IDENTITY:** 6061-T6 ALUMINUM, WELDED with 4043 FILLER I.J.14 TEST TEMPERATURE (°F) 325 AIRFRAME / ENGINE, JOINING MATERIAL USE: **EXPOSURE TIME (DAYS)** 28 TEST ADDITIVE/FUEL: Betz Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **TEST DATE START:** 1 NOV 95 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST M	ATERIAL /	FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	}		
MATERIAL			RESU	JLTS				(OVERAL	L
PROPERTY TESTS	JP	-8	JP-8	+100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L1	L	L1	L	L1	Discoloration / Deposits All Samples	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	5.8784	5.8698	5.6562	5.6564	5.9747	5.9745				
GAIN / LOSS (gms)		0086		+.0002		0002		CN	W	W
MICROSCOPY EVAL.										

FUELS	T	EST FUE		ERIAL E IODS (28 I		RE	P		CONTRO S. POST (STR	_	YS @ 200°F	·)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C4	С3	C5	С3	C4	С	C2	С	C2	C	C2		О	О	0
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	171	132	409	225	681	686	108	123	248	141	912	555	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY		1								
	50	NE	90	NE	130	NE	NE		NE		NE			NE	NE	NE
	ND	NE	10	NE	20	NE	NE		NE		NE			NE	NE	NE
	10	NE	30	NE	70	NE	NE		NE		NE			NE	NE	NE
	140	NE	130	NE	100	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE Greater than 500 ppb GT =LT = Less than 500 ppb**UDRI P.I. ENG:** D.H. KALT

No Spec. Req. and/or 4 (x) Additive Concentration NSR =A.F. AUT. W./MLSA: L. PERKINS A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. LJ.15 MATERIAL / IDENTITY: 5052 H34 WELDED TO 6061-T6 WITH 5356 FILLER

TEST TEMPERATURE (°F) 200 USE: AIRFRAME / ENGINE, JOINING MATERIAL

EXPOSURE TIME (DAYS) 28 TEST ADDITIVE/FUEL: Betz Dearborn 8Q462 ((Normal and x4 Concentrations) /92 POSF 2926

TEST DATE START: 14 AUG 97 JP-8 BASELINE FUEL: 92 POSF 2926 + (JP-8 Additives)

			_													
		TEST M	ATERIAL /	FUEL EXP	POSURE				EVA	LUATI	ON O	F TEST	RESULTS	5		
MATERIAL			RESU	JLTS										(OVERAL	L
PROPERTY TESTS	JP	·-8	JP-8	+100	JP8+1	00 (X4)		OBSER	VATIO	NS AND	REFE	ERENC	E S	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST								JP8	+100	X4
COLOR	L	L1	L	L1	L	L1								CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND								CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND								CN	W	W
AVG. WT. (gms)	11.4976	11.4983	11.4854	11.4855	11.6131	11.6133										
GAIN / LOSS (gms)		+.0007		+.0001		+.0002								CN	W	W
MICROSCOPY EVAL.																
															="	
FUFLS	T	EST FUE				RE	P		CONTRO S. POST (STR	-	YS @ 200°I	7)	SPEC. RANGE		T RESU	
FUELS PROPERTY TESTS*	T		L / MATI DAY PERI			RE				RESSED 7 DA	•	7) - 100 x4	SPEC. RANGE FOR JP-8		T RESU GENERA SERVATION	L
	7					RE 28		RE (NEW) V	S. POST (STR	RESSED 7 DA	•		RANGE		GENERA	L
	7 C1	4 X 7		IODS (28 I		_	JI	RE (NEW) V 2-8	S. POST (STR JP-8	RESSED 7 DA + 100	JP-8 +	100 x4	RANGE FOR JP-8 MIN /	OBS	GENERA SERVATIO	L ONS
PROPERTY TESTS*	7	4 X 7]	DAY PERI	28	DAYS)	28	JI PRE	P-8 POST	S. POST (STR JP-8 PRE	RESSED 7 DA + 100 POST	JP-8 + PRE	POST	RANGE FOR JP-8 MIN /	OBS JP8	GENERA SERVATIO +100	L ONS X4
PROPERTY TESTS* COLOR (7 DAYS)	7 C1	4 X 7 1 28 C1	7 C1	28 C1	7 C1	28 C1	JI PRE	P-8 POST	S. POST (STR JP-8 PRE	RESSED 7 DA + 100 POST	JP-8 + PRE	POST	RANGE FOR JP-8 MIN /	OBS JP8	GENERA SERVATIO +100	L ONS X4
PROPERTY TESTS* COLOR (7 DAYS) CONDUCTIVITY (AVG. of 4)	7 C1 PRE	28 C1 POST	7 C1 PRE	28 C1 POST	OAYS) 7 C1 PRE	28 C1 POST	PRE C	P-8 POST C2	S. POST (STR JP-8 PRE C	POST C2	JP-8 + PRE	100 x4 POST C2	RANGE FOR JP-8 MIN / MAX	OBS JP8 W	GENERA GERVATIO +100 W	L ONS X4 W

NE

NE

NE

NOTES:

Metallic Color: L = Light (No Deposit) L1 - L2 = Discoloration/Deposits

NE

NE

NE

Fuel Color: C = Clear C1 - C6 = Light to Dark

NE

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NE

NE

NE

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

NE

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NE

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NE

Comparisons: W = Within Allowable Requirement;

OT = Material Tested Beyond Temperature Range O = Outside Allowable Requirement
N/A = Not applicable; CN = Control UTC ENG: J. LEONE
GT = Greater than 500 ppb LT = Less than 500 ppb UDRI P.I. ENG: D.H. KALT

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DATE:

A.F. AUT. WL/POSF

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24 APR 98

S. A. ANDERSON

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NSR = No Spec. Req. and/or 4(x) Additive Concentration

LT = Less than 500 ppb

LT = Less than 500 ppb

UDRI P.I. ENG:

A.F. AUT. W./MLSA:

L. PERKINS

TEST PLAN I.D. NO. **MATERIAL / IDENTITY:** I.J.16 Sn 95, Sh 05 SOLDER ON B 36-21A TEST TEMPERATURE (°F) 200 JOINING MATERIAL USE: **EXPOSURE TIME (DAYS)** 28 TEST ADDITIVE/FUEL: Betz Dearborn 8Q462 ((Normal and x4 Concentrations) /92 POSF 2926 **TEST DATE START:** 18 SEP 97 JP-8 BASELINE FUEL: 92 POSF 2926 + (JP-8 Additives)

		TEST M	ATERIAL /	FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	5		
MATERIAL			RESU	JLTS				(OVERAL	L
PROPERTY TESTS	JP	-8	JP-8	+100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	EV	VALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L2	L	L1	L	L2		CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	17.2023	17.1989	17.1897	17.1872	17.3015	17.3002				
GAIN / LOSS (gms)		0034		0025		0013		CN	W	W
MICROSCOPY EVAL.									·	

		•	="	•		•	-				-					
FUELS	T	EST FUE 4 X 7		ERIAL E IODS (28 I		RE	P	PRE (NEW) V	CONTRO S. POST (STE	_	YS @ 200°I	?)	SPEC. RANGE		ST RESU GENERAL	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	- 100 x4	FOR JP-8	OBS	SERVATIO	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C1	C2	C1	C2	C1	C1	С	C2	С	C2	С	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	228	105	385	423	599	807	50	4	300	57	569	241	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME N/A =Not applicable; CN = ControlUTC ENG: J. LEONE Greater than 500 ppb GT =LT = Less than 500 ppb**UDRI P.I. ENG:** D.H. KALT

NSR =No Spec. Req. and/or 4 (x) Additive Concentration

A.F. AUT. W./MLSA: L. PERKINS A.F. AUT. WL/POSF S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. I.K.1.1 **MATERIAL / IDENTITY:** COVER, INK STAMP, COATINGS, TOP COATING, QQ-A-25011 TEST TEMPERATURE (°F) 200 **USE:** AIRFRAME, FUEL SYSTEM NAME TAGS 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL: TEST DATE START:** 27 AUG '96 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

	TEST MAT	TERIAL / FUEL	EXPOSURE	TEST	EVALUA	TION CRIT	TERIA		EVAI	LUATIO	N OF TES	ST R	ESUL	ΓS
MATERIAL		RESULTS	1	CONTROL MAT	Al	LLOWABLE		CE		ISON TO CO			OVERAL	
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT			REMENT			BLE REQUII			VALUATI	
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)														
ELONGATION (%)														
VOLUME SWELL (%)														
HARD'S; a) SHORE A (PTS)														
b) PENCIL														
COMP. SET (avg. 2 spcm's)														
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
WET DIELECTRIC(mA)	P	P	P	P	P				P	P	P	W	W	W
	TEST FUE	L / MATERIAL	EXPOSURE		CONTR	OL FUEL								
FUELC	477.50	V DEDIODE	40 D 4 T/G)	DDE NE	W VC DOCT	CTDECCED) *	E 7 DANC		CDEC	EICATION I	NAMOR		CENEDA	

	TEST FUEL	L / MATERIAL	EXPOSURE			CONTR	OL FUEL							
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	V) VS. POST (STRESSED) °I	F 7 DAYS		SPECIFICAT	ION RANGE	(GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JP-8 PRE POST		JP-8	+ 100	JP-8 +	100 x4	FOR	JP-8	OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	C1	C1	C1	С	C1	C	CC1	C	C1			W	W	W
ACID NO. mgKOH/gm	.005	.004	.007	0.001	0.004	0.001	0.003	0.003	0.003		0.015	\mathbf{W}	\mathbf{W}	W
GUMS mg/100ml	2.0	6.4	17.8	2	3.2	4.4	4.8	9.6	3.8		7	\mathbf{W}	W	О
HYDROPEROXIDES mM/l	.01	.02	.02	.004	0.01	0	0.01	0	0.01			\mathbf{W}	\mathbf{W}	\mathbf{W}
CONDUCTIVITY pS/m @72°F	112	323	547	108	39	248	131	912	410	150	600	О	W	W
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail DATE: NE =Within Allowable Requirement: W =UDRI TECH:

O = Outside Allowable Requirement J. DUES OT =**Material Tested Beyond Temperature Range** UDRI ENG: B. WILT Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive ConcentrationUDRI P.I. ENG: D.H. KALT N/A =A.F. AUT. W./MLSE: __A. FLETCHER

24 MAR 98

A.F. AUT. WL/POSF S. A. ANDERSON

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. I.K.1.2 **MATERIAL / IDENTITY:** COVER, INK STAMP, COATINGS, TOP COATING, QQ-A-25011 TEST TEMPERATURE (°F) 200 USE: AIRFRAME, FUEL SYSTEM NAME TAGS 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL: TEST DATE START:** 27 AUG '96 93 POSF 2980 + (JP-8 Additives) JP-8 BASELINE FUEL:

	TEST MAT	TERIAL / FUEL	EXPOSURE		TEST	EVALUA'	TION CRIT	TERIA		EVAI	LUATIO	N OF TE	ST R	ESUL	ΓS
MATERIAL		RESULTS		CONTR	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO C	ONTROL &	(OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIR	REMENT		ALLOWA	BLE REQUI	IREMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)															
ELONGATION (%)															
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
WET DIELECTRIC(mA)	P	P	P]	P	P				P	P	P	W	W	W
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	W) VS. POST (STRESSED) °1	F 7 DAYS		SPECI	FICATION	RANGE	1 (GENERA	T.
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	TI	P-8	ID Q	+ 100	ID Q	100 x4		FOR JP-8			SERVATI	
FROFERTT TESTS	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	FOR 31 -0	MAX	JP8	+100	X4
207.07	~	~4	~4	~	~4	~	~ ~ ~	~	~-						
COLOR (7 DAYS)	C2	C1	C1	C	C1	C	C1	C	C1			0.015	W	W	W
ACID NO. mgKOH/gm	.004	.004	.006	.001	.004	.001	0.003	0.003	0.003			0.015	W	W	W
GUMS mg/100ml	2.0	6.2	17.8	2	3.2	4.4	4.8	9.6	3.8			7	W	W	0
HYDROPEROXIDES mM/l	.02	.01	.01	.004	0.01	0	0.01	0	0.01	4.50		600	W	W	W
CONDUCTIVITY pS/m @72°F	119	329	582	108	39	248	131	912	410	150		600	W	W	W
VISUAL OBSERVATIONS															

NOTES:

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

W = Within Allowable Requirement; O = Outside Allowable Requirement

OT = Material Tested Beyond Temperature Range

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

A.F. AUT. W./MLSE: A. FLETCHER

A.F. AUT. WL/POSF S. A. ANDERSON

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

DATE:

UDRI TECH:

UDRI P.I. ENG:

UDRI ENG:

24 MAR 98

J. DUES

B. WILT

D.H. KALT

TEST PLAN I.D. NO. I.K.1.3 MATERIAL / IDENTITY: COVER INK STAMP, COATINGS, OO-B-25011 AIRFRAME, FUEL SYSTEM, COMP COATINGS TEST TEMPERATURE (°F) 200 USE: 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL:** 27 AUG '96 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

	TEST MAT	TERIAL / FUEL	EXPOSURE		TEST	EVALUA'	TION CRIT	ERIA		EVAI	LUATIO	ON OF TE	ST R	ESULT	ΓS
MATERIAL		RESULTS		CONTR	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO C	ONTROL &		OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIE	REMENT		ALLOWA	BLE REQU	IREMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)															
ELONGATION (%)															
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
WET DIELECTRIC(mA)	P	P	P	l l	P	P				P	P	P	W	W	W
	TEST FUEL	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	V) VS. POST ((STRESSED) °	F 7 DAYS		SPECI	FICATION	RANGE		GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JF	- -8	JP-8	+ 100	JP-8 +	100 x4	1	FOR JP-8	}	OB	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C1	C1	C	C1	C	C1	C	C1				W	W	W
ACID NO. mgKOH/gm	.004	.003	.007	.001	.004	.001	.003	.003	.003			0.015	\mathbf{W}	\mathbf{W}	\mathbf{W}
GUMS mg/100ml	2.0	5.4	17.8	2	3.2	4.4	4.8	9.6	3.8			7	W	W	О
HYDROPEROXIDES mM/l	.01	.01	.01	.004	.01	0	0.01	0	0.01				W	W	W
CONDUCTIVITY pS/m @72°F	114	395	552	108	39	248	131	912	410	150		600	0	W	\mathbf{W}

NOTES:

VISUAL OBSERVATIONS

C1 - C6 = Light to Dark **Fuel Color:** $\mathbf{C} =$ Clear

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

W =Within Allowable Requirement; O = Outside Allowable Requirement OT =**Material Tested Beyond Temperature Range**

N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive ConcentrationUDRI P.I. ENG: D.H. KALT * Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: A. FLETCHER A.F. AUT. WL/POSF S. A. ANDERSON

Between Material Degradation and Fuel Properties Degradation

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

DATE:

UDRI TECH:

UDRI ENG:

24 MAR 98

J. DUES

B. WILT

TEST PLAN I.D. NO. **I.K.4 MATERIAL / IDENTITY:** NAME PLATE, QQA-250/1, COLOR A11136, FED, STD,-596 TEST TEMPERATURE (°F) 200 USE: AIRFRAME, FUEL SYSTEM NAME TAG COATINGS 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL:** 27 AUG '96 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

	TEST MAT	ERIAL / FUEL	EXPOSURE		TEST	EVALUA	TION CRIT	ERIA		EVAI	LUATIO	N OF TE	ST R	ESULT	rs
MATERIAL		RESULTS		CONTR	OL MAT	AI	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO C	ONTROL &	(OVERALI	
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIR	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	VALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)															
ELONGATION (%)															
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
WET DIELECTRIC(mA)	P	P	P]	<u> </u>	P				P	P	P	W	W	W
	TEST FUEL	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	W) VS. POST (STRESSED) °	F 7 DAYS		SPECI	FICATION	RANGE		GENERAI	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JF	- -8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-8		OBS	SERVATIO	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	C1	C1	C1	С	C1	C	C1	С	C1				W	W	W
ACID NO. mgKOH/gm	.004	.004	.006	.001	0.004	0.001	0.003	.003	0.003			0.015	\mathbf{W}	W	W
GUMS mg/100ml	2.6	6.2	17.6	2	3.2	4.4	4.8	9.6	3.8			7	W	W	О
HYDROPEROXIDES mM/l	.01	.01	.01	.004	0.01	0	0.01	0	0.01				\mathbf{W}	W	W
CONDUCTIVITY pS/m @72°F	108	334	573	108	39	248	131	912	410	150		600	О	W	W

NOTES:

VISUAL OBSERVATIONS

C1 - C6 = Light to Dark **Fuel Color:** $\mathbf{C} =$ Clear

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

W =Within Allowable Requirement; O = Outside Allowable Requirement OT =**Material Tested Beyond Temperature Range**

N/A =Not applicable;

NSR = No Spec. Req. and/or 4 (x) Additive ConcentrationUDRI P.I. ENG: D.H. KALT * Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: A. FLETCHER

Between Material Degradation and Fuel Properties Degradation

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

DATE:

UDRI TECH:

UDRI ENG:

24 MAR 98

J. DUES

B. WILT

A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. I.K.7 MATERIAL / IDENTITY: CARBON BEARING, CR PLATE, AMS 5613 TEST TEMPERATURE (°F) 200 USE: AIRFRAME, PUMP, COATINGS 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL:** 5 DEC '96 93 POSF 2980 **TEST DATE START:** JP-8 BASELINE FUEL: + (JP-8 Additives)

	TEST MAT	ERIAL / FUEL	EXPOSURE	TEST	EVALUA'	TION CRIT	ΓERIA		EVAI	LUATIO	OF TE	ST R	ESUL	ГS
MATERIAL		RESULTS		CONTROL MAT	A	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	NTROL &		OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUII	REMENT		ALLOWA	BLE REQUII	REMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)														
ELONGATION (%)														
VOLUME SWELL (%)														
HARD'S; a) SHORE A (PTS)														
b) PENCIL														
COMP. SET (avg. 2 spcm's)														
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
WET DIELECTRIC(mA)	P	P	P	P	P				P	P	P	W	W	W
	TEST FUEL	L / MATERIAL	EXPOSURE		CONTR	OL FUEL								

	•													
	TEST FUE	L / MATERIAL	EXPOSURE			CONTRO	OL FUEL							
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	W) VS. POST (STRESSED) °	F 7 DAYS		SPECIFICA'	TION RANGE		GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JP-8 PRE POST		JP-8	+ 100	JP-8 +	100 x4	FOR	2 JP-8	OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	C1	C1	C1	C C1		С	C1	С	C1			W	W	W
ACID NO. mgKOH/gm	NE	NE	NE	.001	.004	.001	.003	.003	.003		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	2	3.2	4.4	4.8	9.6	3.8		7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.004	.01	0	0.01	0	0.01			NE	NE	NE
CONDUCTIVITY pS/m @72°F	103	352	775	108	39	248	131	912	410	150	600	0	W	О
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail DATE:

W = Within Allowable Requirement; O = Outside Allowable Requirement UDRI TECH: J. DUES
OT = Material Tested Beyond Temperature Range
N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration
UDRI P.I. ENG: D.H. KALT

24 MAR 98

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

* A.F. AUT. W./MLSE: __A. FLETCHER

Between Material Degradation and Fuel Properties Degradation

A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. I.K.8.2 **MATERIAL / IDENTITY:** PUMP, Carbon TEST TEMPERATURE (°F) 325 USE: AIRFRAME, COATINGS, BEARINGS 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **TEST ADDITIVE/FUEL: EXPOSURE TIME (DAYS)** 2 JUL '96 93 POSF 2980 **TEST DATE START:** JP-8 BASELINE FUEL: + (JP-8 Additives)

	TEST MAT	ERIAL / FUEL	EXPOSURE	TEST	EVALUA	TION CRIT	TERIA		EVAI	LUATION	OF TE	ST R	ESULT	ГS
MATERIAL		RESULTS		CONTROL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	NTROL &	(OVERALI	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUIF	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)														
ELONGATION (%)														
VOLUME SWELL (%)														
HARD'S; a) SHORE A (PTS)														
b) PENCIL														
COMP. SET (avg. 2 spcm's)														
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
WET DIELECTRIC(mA)	P	P	P	P	P				P	P	P	W	W	W
	TECT ELLEI	/MATERIAI	EVDOCUDE		CONTER	OI FUEL			n					

	TEST FUEI	L / MATERIAL	EXPOSURE			CONTR	OL FUEL							
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	V) VS. POST (STRESSED) °I	F 7 DAYS		SPECIFICAT	TION RANGE		GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JP-8 PRE POST		JP-8	+ 100	JP-8 +	100 x4	FOR	JP-8	OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C2	C2	C	C2	C	C2	С	C2			W	W	W
ACID NO. mgKOH/gm	.004	.006	.010	.001	.007	.001	.006	.003	.008		0.015	W	W	W
GUMS mg/100ml	3.2	5.8	12.0	2	3	4.4	3.4	9.6	12.2		7	\mathbf{W}	\mathbf{W}	О
HYDROPEROXIDES mM/l	ND	ND	ND	.004	.017	0	.015	0	.008			W	W	W
CONDUCTIVITY pS/m @72°F	NE	NE	NE	108	123	248	141	912	555	150	600	NE	NE	NE
VISUAL OBSERVATIONS	(.1328)gms	(.1014)gms	(.1087)gms							_		W	W	W

DATE:

UDRI TECH:

UDRI ENG:

24 MAR 98

J. DUES

B. WILT

NOTES:

Fuel Color: $\mathbf{C} =$ C1 - C6 = Light to Dark Clear

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

W =Within Allowable Requirement; O = Outside Allowable Requirement OT =**Material Tested Beyond Temperature Range**

N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

UDRI P.I. ENG: D.H. KALT * Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: __A. FLETCHER **Between Material Degradation and Fuel Properties Degradation** A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. I.K.8.3 **MATERIAL / IDENTITY: PUMP CARBON** TEST TEMPERATURE (°F) 325 **USE: AIRFRAME, BEARINGS, P5N2** 28 **TEST ADDITIVE/FUEL:** Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** 2 JUL '96 93 POSF 2980 **TEST DATE START:** JP-8 BASELINE FUEL: + (JP-8 Additives)

	TEST MA	TERIAL / FUEL	EXPOSURE	TEST	Γ EVALUA'	TION CRIT	TERIA		EVAl	LUATIO	N OF TE	ST R	ESUL'	ΓS
MATERIAL		RESULTS		CONTROL MAT	A]	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	NTROL &		OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUII	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	VALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)														
ELONGATION (%)														
VOLUME SWELL (%)														
HARD'S; a) SHORE A (PTS)														
b) PENCIL														
COMP. SET (avg. 2 spcm's)														
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
WET DIELECTRIC(mA)	P	P	P	P	P				P	P	P	W	W	W
	TEST FUE	EL / MATERIAL	EXPOSURE		CONTR	OL FUEL								
FUELS	4 X 7 DA	AY PERIODS	(28 DAYS)	PRE-NE	W) VS. POST	(STRESSED) °	F 7 DAYS		SPEC	IFICATION I	RANGE		GENERA	L
1									11					

	TEST FUEL	L / MATERIAL	EXPOSURE			CONTRO	OL FUEL							
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	V) VS. POST (STRESSED) °	F 7 DAYS		SPECIFICAT	TION RANGE	(GENERA	.L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR	JP-8	OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	С	C2	C	C2	C	C2			NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.007	.001	.006	.003	.008		0.015	NE	NE	NE
GUMS mg/100ml	1.6	7.4	14.4	2	3	4.4	3.4	9.6	12.2		7	\mathbf{W}	O	О
HYDROPEROXIDES mM/l	NE	NE	NE	.004	.017	0	.015	0	.008			NE	NE	NE
CONDUCTIVITY pS/m @72°F	NE	NE	NE	108	123	248	141	912	555	150	600	NE	NE	NE
VISUAL OBSERVATIONS	(.0953)	(.2294)	(.2010)									\mathbf{W}	W	W

DATE:

UDRI TECH:

UDRI ENG:

24 MAR 98

J. DUES

B. WILT

NOTES:

Fuel Color: $\mathbf{C} =$ C1 - C6 = Light to Dark Clear

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

W =Within Allowable Requirement; O = Outside Allowable Requirement OT =**Material Tested Beyond Temperature Range**

N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

UDRI P.I. ENG: D.H. KALT * Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: __A. FLETCHER Between Material Degradation and Fuel Properties Degradation A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. I.K.12 MATERIAL / IDENTITY: FUEL / OTY PROBE MATERIAL TEST TEMPERATURE (°F) 200 USE: FUEL QT, PROBE, 40%GLASS FILED POLYPHENYLENE SULFIDE Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /92 POSF 2926 28 **TEST ADDITIVE/FUEL: EXPOSURE TIME (DAYS)** 3 JUL 97 92 POSF 2926 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

									(0 = 0 = 0 = 0					_	
	TEST MAT	TERIAL / FUEL	EXPOSURE		TEST	TEVALUA	FION CRIT	TERIA		EVAI	LUATIC	ON OF TE	ST R	ESUL T	rs
MATERIAL		RESULTS		CONTR	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO C	CONTROL &	,	OVERALI	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIF	REMENT		ALLOWA	BLE REQU	IREMENTS	E	VALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	NT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)															
ELONGATION (%)															
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)	100	100	100	10	00	0				P	P	P	W	W	W
b) PENCIL	100	100	100	10	00	0				P	P	P	\mathbf{W}	W	\mathbf{W}
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
WET DIELECTRIC(mA)	P	P	P]	P	P				P	P	P	W	W	W
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								_
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	W) VS. POST (F 7 DAYS		SPECI	IFICATION	RANGE	(GENERAI	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	P-8	JP-8	+ 100	JP-8 +	- 100 x4		FOR JP-8	3	OBS	SERVATIO	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)															

0.015

7

600

24 MAR 98

J. DUES

B. WILT

150

DATE:

UDRI TECH:

UDRI ENG:

NOTES:

ACID NO. mgKOH/gm

HYDROPEROXIDES mM/l CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

GUMS mg/100ml

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

W = Within Allowable Requirement; O = Outside Allowable Requirement
OT = Material Tested Beyond Temperature Range

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration UDRI P.I. ENG: D.H. KALT

Try Test Data Was Collected to Establish Whether Any Correlation Exists

A F. ALT W/MLSE: A FLETCH

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

A.F. AUT. W./MLSE: A. FLETCHER

A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. I.L.1 MATERIAL / IDENTITY: THREADLOCK, GRADE A OR AV TEST TEMPERATURE (°F) 200 USE: AIRFRAME, LOCKING DEVICES 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL:** 4 SEP '95 92 POSF 2926 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

TEST MAT	ERIAL / FUEL	EXPOSURE	TEST	EVALUAT	TION CRIT	ERIA		EVAI	LUATION	OF TE	ST R	ESUL :	ΓS
	RESULTS		CONTROL MAT	AI	LOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	NTROL &	(OVERAL	L
JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUIR	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATI	ON
POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
15	23	20	15	N/A		N/A		P	P	P	\mathbf{W}	\mathbf{W}	W
·								-					
	JP-8 POST	RESULTS JP-8 JP-8+100 POST POST	JP-8 JP-8 +100 JP8+100 (X4) POST POST POST	RESULTS	RESULTS	RESULTS JP-8 JP-8 +100 JP8+100 (X4) POST POST POST AMBIENT TEMP MEASURED AT AMBIENT TEMP DECREASE MIN VALUE MIN VALUE	RESULTS	RESULTS	RESULTS CONTROL MAT JP-8 JP-8 +100 JP8+100 (X4) POST POST POST POST DECREASE MIN VALUE MEASURED AT AMBIENT TEMP DECREASE MIN VALUE INCREASE MAX VALUE JP-8 JP-8 JP-8 JP-8 JP-8 JP-8 JP-8 JP-	RESULTS	RESULTS	RESULTS CONTROL MAT MEASURED AT AMBIENT TEMP DECREASE MIN VALUE	RESULTS CONTROL MAT JP-8 JP-8+100 JP8+100 (X4) POST POST POST POST POST AMBIENT TEMP DECREASE MIN VALUE INCREASE MAX VALUE INCREASE MAX VALUE INCREASE MAX VALUE INCREASE MIN VALUE INCREASE MAX VALUE

	TEST FUEL	L / MATERIAL	EXPOSURE			CONTRO	OL FUEL							
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV		STRESSED) °I	F 7 DAYS		SPECIFICAT	ΓΙΟΝ RANGE		GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR	JP-8	OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	С	C1	С	C1	С	C1			NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.001	.001	.002	.003	.003		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	.6	.8	4.4	2.8	9.6	8.6		7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.001	.002	0	.032	0	.018			NE	NE	NE
CONDUCTIVITY pS/m @72°F	NE	NE	NE	100	66	248	131	912	410	150	600	NE	NE	NE
VISUAL OBSERVATIONS														

DATE:

24 MAR 98

J. DUES

NOTES:

Fuel Color: $\mathbf{C} =$ C1 - C6 = Light to Dark Clear

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

W =Within Allowable Requirement; O = Outside Allowable Requirement UDRI TECH: OT =**Material Tested Beyond Temperature Range UDRI ENG:**

B. WILT N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive ConcentrationUDRI P.I. ENG:

D.H. KALT * Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: __A. FLETCHER A.F. AUT. WL/POSF S. A. ANDERSON

Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. **I.L.2** MATERIAL / IDENTITY: THREADLOCK, (RED) MIL-S-22473 AIRFRAME, FUEL SYSTEM LOCKING DEVICES TEST TEMPERATURE (°F) 200 USE: 28 **TEST ADDITIVE/FUEL:** Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** 92 POSF 2926 + (JP-8 Additives) 4 SEP '95 **TEST DATE START:** JP-8 BASELINE FUEL:

	TEST MAT	TERIAL / FUEL	EXPOSURE	TEST	EVALUA	TION CRIT	ERIA		EVAI	LUATION	OF TE	ST R	ESULT	rs
MATERIAL		RESULTS		CONTROL MAT	Al	LOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	NTROL &	(OVERAL	Ĺ
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUIR	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)														
ELONGATION (%)														
VOLUME SWELL (%)														
HARD'S; a) SHORE A (PTS)														
b) PENCIL														
COMP. SET (avg. 2 spcm's)														
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)	32	52	48	34		N/A		N/A	P	P	P	W	\mathbf{W}	\mathbf{W}
RUPTURE PRESS. (IN.HG)				·										
WET DIELECTRIC(mA)														
WET DIELECTRIC(mA)														

	TEST FUEL	L / MATERIAL	EXPOSURE			CONTR	OL FUEL							
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	W) VS. POST (STRESSED) °1	F 7 DAYS		SPECIFICAT	TION RANGE	(GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR	JP-8	OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	С	C1	C	C1	С	C1			NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.001	.001	.002	.003	.003		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	.6	.8	4.4	2.8	9.6	8.6		7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.001	.002	0	.032	0	.018			NE	NE	NE
CONDUCTIVITY pS/m @72°F	NE	NE	NE	100	66	248	131	912	410	150	600	NE	NE	NE
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: C = Clear C1 - C6 = Light to Dark

W = Within Allowable Requirement; O = Outside Allowable Requirement OT = Material Tested Beyond Temperature Range

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration UDRI P.I. ENG: D.H. KALT

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: A.F. AUT. W./MLSE:

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

A.F. AUT. WL/POSF <u>S. A. ANDERSON</u>

24 MAR 98

J. DUES

B. WILT

DATE:

UDRI TECH:

UDRI ENG:

TEST PLAN I.D. NO. **I.L.3** MATERIAL / IDENTITY: THREADLOCK, (BROWN) TEST TEMPERATURE (°F) 200 **USE:** AIRFRAME, FUEL SYSTEM, LOCKING DEVICES 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL:** 4 SEP '95 92 POSF 2926 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

	TEST MAT	TERIAL / FUEL	EXPOSURE	TEST	EVALUA	TION CRIT	ERIA		EVAI	LUATION	N OF TE	ST R	ESUL'	ΓS
MATERIAL		RESULTS		CONTROL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	NTROL &	(OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUIR	REMENT		ALLOWA	BLE REQUII	REMENTS	EV	VALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)														
ELONGATION (%)														
VOLUME SWELL (%)														
HARD'S; a) SHORE A (PTS)														
b) PENCIL														
COMP. SET (avg. 2 spcm's)														
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)	15	23	23	13		N/A		N/A	P	P	P	\mathbf{W}	W	W
RUPTURE PRESS. (IN.HG)				_										
WET DIELECTRIC(mA)														

	TEST FUEL	L / MATERIAL	EXPOSURE			CONTR	OL FUEL							
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV		(STRESSED) °	F 7 DAYS		SPECIFICA	ΓΙΟΝ RANGE		GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	2-8	JP-8	+ 100	JP-8 +	100 x4	FOR	JP-8	OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	С	C1	С	C1	С	C1			NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.001	.001	.002	.003	.003		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	.6	.8	4.4	2.8	9.6	8.6		7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.001	.002	0	.032	0	.018			NE	NE	NE
CONDUCTIVITY pS/m @72°F	NE	NE	NE	100	66	248	131	912	410	150	600	NE	NE	NE
VISUAL OBSERVATIONS														

DATE:

UDRI TECH:

UDRI ENG:

24 MAR 98

J. DUES

B. WILT

NOTES:

Fuel Color: $\mathbf{C} =$ C1 - C6 = Light to Dark Clear

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

W =Within Allowable Requirement; O = Outside Allowable Requirement OT =**Material Tested Beyond Temperature Range**

N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration UDRI P.I. ENG:

D.H. KALT * Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: __A. FLETCHER Between Material Degradation and Fuel Properties Degradation A.F. AUT. WL/POSF S. A. ANDERSON

I.L.4 IM19/IIM10 TEST PLAN I.D. NO. MATERIAL / IDENTITY: LOCKWIRE, SEE (I.M.19/II.M.10) TEST TEMPERATURE (°F) 200 USE: AIRFRAME/ENGINE FUEL SYSTEMS 28 **TEST ADDITIVE/FUEL:** Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** See IM19/IIM10 92 POSF 2926 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

							_			,					
	TEST MAT	TERIAL / FUEL	EXPOSURE		TEST	TEVALUA'	TION CRIT	TERIA		EVAI	LUATIO	N OF TE	ST R	ESUL	ΓS
MATERIAL		RESULTS		CONTR	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPARI	ISON TO CO	NTROL &		OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIF	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	VALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	NT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)															
ELONGATION (%)															
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS) b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
WET DIELECTRIC(mA)															
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NE	W) VS. POST ((STRESSED) °	F 7 DAYS		SPECI	FICATION I	RANGE		GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	P-8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-8		OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)															
ACID NO. mgKOH/gm												0.015			

NOTES:

GUMS mg/100ml

HYDROPEROXIDES mM/l CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail DATE:

W = Within Allowable Requirement; O = Outside Allowable Requirement UDRI TECH: J. DUES
OT = Material Tested Beyond Temperature Range
N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration
UDRI P.I. ENG: D.H. KALT

7

600

24 MAR 98

150

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

* A.F. AUT. W./MLSE: __A. FLETCHER

* Fuel Property Test Data was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. I.M.1 MATERIAL / IDENTITY: 5052-0 ALUMINUM (BARE)

TEST TEMPERATURE (°F) 200 USE: AIRFRAME / FUEL SYSTEM / LINES

EXPOSURE TIME (DAYS) 28 TEST ADDITIVE/FUEL: Betz Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980

TEST DATE START: 8 SEP 94 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST M	IATERIAL	FUEL EXF	POSURE				EV A	ALUATI	ION O	F TEST	RESULTS	5		
MATERIAL			RESU	JLTS											OVERAL	L
PROPERTY TESTS	JI	P-8	JP-8	+100	JP8+1	100 (X4)		OBSER	RVATIO	NS ANL	REFI	ERENC	E S	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST								JP8	+100	X4
COLOR	L	L	L	L	L	L								CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND								CN	W	W
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P			h Negligible) (-				CN	W	W
AVG. WT. (gms)	5.1627	5.1625	5.1694	5.1692	5.1336	5.1334	Conductivi	ity (%IACS) a								
GAIN / LOSS (gms)		0002		0002		0002				CN	W	W				
MICROSCOPY EVAL.																
FUELS	T	EST FUE 4 X 7		ERIAL E IODS (28 I		RE	P	RE (NEW) V	CONTRO S. POST (STE	_	YS @ 200°l	?)	SPEC. RANGE		ST RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	- 100 x4	FOR JP-8	OBS	SERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C1	C1	C1	C1	C1	C1	С	C1	С	C1	C	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	94	158	220	148	738	391	108	123	248	141	912	555	150/600	W	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NI
		<u> </u>		ļ	ļ	ļ	ļ									

NOTES:

Metallic Color: L = Light (No Deposit) L1 - L2 = Discoloration/Deposits

NE

NE

NE

Fuel Color: C = Clear C1 - C6 = Light to Dark

NE

NE

NE

NE

NE

NE

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

NE

NE

NE

NE

NE

NE

NE

NE

NE

Comparisons: W = Within Allowable Requirement; DATE: 24 APR 98
OT = Material Tested Beyond Temperature Range O = Outside Allowable Requirement UDRI TECH: A. BEHME

NE

NE

NE

N/A = Not applicable; CN = Control UTC ENG: J. LEONE
GT = Greater than 500 ppb LT = Less than 500 ppb UDRI P.I. ENG: D.H. KALT

NSR = No Spec. Req. and/or 4 (x) Additive Concentration

A.F. AUT. W./MLSA:

L. PERKINS

A.F. AUT. WL/POSF

S. A. ANDERSON

NE

TEST PLAN I.D. NO. I.M .1 MATERIAL / IDENTITY: 5052-0 ALUMINUM (BARE)

TEST TEMPERATURE (°F) 325 USE: AIRFRAME / FUEL SYSTEM / LINES

EXPOSURE TIME (DAYS) 28 TEST ADDITIVE/FUEL: Betz Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980

TEST DATE START: 3 MAR 95 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST M	IATERIAL .	FUEL EXP	OSURE				EVA	LUATI	[ON O]	F TEST	RESULTS	5		
MATERIAL			RESU	JLTS										(OVERALI	Ĺ
PROPERTY TESTS	JF	P-8	JP-8	+100	JP8+1	00 (X4)		OBSER	RVATIO	NS AND	REFI	ERENC	E S	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST								JP8	+100	X4
COLOR	L	L1	L	L1	L	L1								CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND								CN CN	W	W
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P	734								W	W
AVG. WT. (gms)	5.1554	5.1565	5.1485 5.1498 5.1733 5.1734													
GAIN / LOSS (gms)		+.0011		+.0013		+.0001	Conductiv		CN	W	W					
MICROSCOPY EVAL.		+.0011 +.0013 +.0001 Conductivity (%IACS) and Hardness Measurements Within Specification TEST FUEL / MATERIAL EXPOSURE CONTROL FUEL SPEC.														
	T	TEST FUEL / MATERIAL EXPOSURE CONTROL FUEL SPEC.												TES	T RESU	LTS
FUELS	4 X 7 DAY PERIODS (28 DAYS) PRE (NEW) VS. POST (STRESSED 7 DAYS @ 200°F) RANGE										GENERAL	L				
PROPERTY TESTS*							J	P-8	JP-8	+ 100	JP-8 +	- 100 x4	FOR JP-8	OBS	ERVATION	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	С3	СЗ	C3	С3	C2	С3	С	C2	С	C2	С	C2	MAA	W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	149	9	259	31	564	239	50	4	300	57	569	241	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L = Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

200 gamman, 12 Not 2 to 100 2

Comparisons: W = Within Allowable Requirement; DATE: __24 APR 98 _____
OT = Material Tested Beyond Temperature Range O = Outside Allowable Requirement UDRI TECH: __A.BEHME

N/A = Not applicable;

CT = Control

UTC ENG:

J.LEONE

LT = Les then 500 mb

LT = Les then 500 mb

GT = Greater than 500 ppb LT = Less than 500 ppb UDRI P.I. ENG: D.H. KALT

NSR = No Spec. Req. and/or 4 (x) Additive Concentration L. PERKINS

L. PERKINS

A.F. AUT. WL/POSF

S. A. ANDERSON

TEST PLAN I.D. NO. I.M .2 **MATERIAL / IDENTITY:** 6061-T4 ALUMINUM (BARE) TEST TEMPERATURE (°F) 200 USE: AIRFRAME / FUEL SYSTEM / LINES 28 Betz Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL:** 1 DEC 94 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST M	IATERIAL	FUEL EXI	POSURE		EVALUATION OF TEST RESULTS	5		
MATERIAL			RESU	JLTS				,	OVERAL	L
PROPERTY TESTS	JP	2-8	JP-8	+100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	EV	VALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L1	L	L1	L	L1	Localized Discoloration on JP-8 Sample	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P	Minimum Pitting (Depth Negligible) - All Samples	CN	W	W
AVG. WT. (gms)	5.6598	5.6598	5.6559	5.6561	5.6581	5.6583				
GAIN / LOSS (gms)		.0000		+.0002		+.0002	Conductivity (%IACS) and Hardness Measurements Within Specification	CN	W	W
MICROSCOPY EVAL.										

FUELS	T	TEST FUEL / MATERIAL EXPOSURE 4 X 7 DAY PERIODS (28 DAYS)							CONTRO S. POST (STR		YS @ 200°I	?)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	SERVATIO	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C1	C2	C1	C1	C1	C1	С	C1	С	C1	С	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	28	33	231	143	689	408	47	64	304	194	569	440	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: C1 - C6 = Light to Dark $\mathbf{C} =$ Clear

Designations: NE =Not Evaluated; $ND = Not \ Detected; \quad BD = Below \ Detection$ P = Pitting

Comparisons: W =Within Allowable Requirement;

OT = Material Tested Beyond Temperature Range

N/A =Not applicable; Greater than 500 ppb GT =

NSR = No Spec. Req. and/or 4 (x) Additive Concentration O = Outside Allowable Requirement

CN = ControlLT = Less than 500 ppb

DATE: UDRI TECH: UTC ENG:

UDRI P.I. ENG:

24 APR 98 __A. BEHME J. LEONE D.H. KALT

A.F. AUT. W./MLSA: A.F. AUT. WL/POSF

L. PERKINS S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists **Between Material Degradation and Fuel Properties Degradation**

I.M .2 **MATERIAL / IDENTITY:** 6061-T4 ALUMINUM (BARE) TEST PLAN I.D. NO. TEST TEMPERATURE (°F) 325 AIRFRAME / FUEL SYSTEM / LINES **USE: EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980

5 JAN 96 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST M	IATERIAL .	FUEL EXI	POSURE				EVA	LUAT	ION O	F TEST	RESULTS	5				
MATERIAL			RESU	JLTS										(OVERAL	L		
PROPERTY TESTS	JP	-8	JP-8	+100	JP8+1	00 (X4)		OBSER	VATIO	NS ANL	REFE	ERENC	E S	EV	ALUATI	ON		
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST								JP8	+100	X4		
COLOR	L	L1	L	L1	L	L1								OT	OT	OT		
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND									OT	OT		
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P	Minimum		OT	OT	OT							
AVG. WT. (gms)	5.6691	5.6699	5.6661	5.6661	5.6749	5.6708	5 1											
GAIN / LOSS (gms)		+.0008		.0000		0041	Conductivi	ty (%IACS) a	nd Hardness	Measurement	ts Not in Spe	ec - Samples '	Tested	OT	OT	OT		
MICROSCOPY EVAL.							Above Max	imum Time /	Temp Reheat	for 6061-T4								
FUELS	T			ERIAL E	XPOSUR	RE	P	SPEC. RANGE		T RESU								
		4 A /	DATIEK	1003 (201	JAIS)													
PROPERTY TESTS*	7	28	7	28	7	28		P-8	JP-8			100 x4	FOR JP-8	JP8	ERVATION +100	UNS X4		
	,	20	·	20	_ ′	20	PRE	POST	PRE	POST	PRE	POST	MIN /	JFO	+100	Λ4		

FUELS	4 X 7 DAY PERIODS (28 DAYS)						Р	RE (NEW) V	S. POST (STR	_	YS @ 325°I	6	RANGE		GENERA	
PROPERTY TESTS*		4 A 7	DATTER	1003 (201	JA15)			?-8	`	+ 100		100 x4	FOR JP-8		SERVATION TO SERVA	
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	С3	С3	С3	C2	С3	С	C2	С	C2	С	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	109	11	409	121	668	310	108	123	248	141	912	555	150/600	О	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Al	30	9	90	20	60	152	NE		NE		NE			NE	NE	NE
Mg	10	14	ND	20	10	52	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =Not Evaluated;

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

Not applicable; N/A =CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT

NSR =No Spec. Req. and/or 4 (x) Additive Concentration L. PERKINS A.F. AUT. W./MLSA: A.F. AUT. WL/POSF S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

EVALUATION OF TEST RESULTS

OVERALL

6061-T6 ALUMINUM (BARE) TEST PLAN I.D. NO. I.M .3 **MATERIAL / IDENTITY:** TEST TEMPERATURE (°F) 200 AIRFRAME / FUEL SYSTEM / LINES **USE:**

EXPOSURE TIME (DAYS) 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980

8 SEP 94 93 POSF 2980 + (JP-8 Additives) **TEST DATE START: JP-8 BASELINE FUEL:**

TEST MATERIAL / FUEL EXPOSURE

RESULTS

10171 1 E IX 171 E		RESCEIS										1	O , LICILIE	_		
PROPERTY TESTS	JF	P-8	JP-8	+100	JP8+1	00 (X4)		OBSER	VATIO.	NS AND	REFI	ERENC	E S	EV	VALUATIO	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST								JP8	+100	X4
COLOR	L	L	L	L	L	L								CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND								CN	W	W
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P	Pitting (Ne	gligible Depth	ı) Most Evidei	nt on JP-8 San	nples - Min.	Pitting on A	ll Others	CN	W	W
AVG. WT. (gms)	1.6931	1.6925	1.7329	1.7077	1.7408	1.7404										
GAIN / LOSS (gms)		0006		0252		0004	Conductiv	ity (%IACS) a	nd Hardness	Measurement	s Within Sp	ec.		CN	W	W
MICROSCOPY EVAL.						<u> </u>					_			<u> </u>		
FUELS	T	EST FUE		ERIAL E IODS (28 I		RE	CONTROL FUEL SPEC. PRE (NEW) VS. POST (STRESSED 7 DAYS @ 325°F) RANGE JP-8 JP-8 + 100 JP-8 + 100 x4 FOR JP-8								ST RESU GENERAI	
PROPERTY TESTS*							JP-8 JP-8 + 100 JP-8 + 100 x4 FOR JP-8							OBS	SERVATIO	ONS
	7	28	7	28	7	28	JP-8 JP-8 + 100 JP-8 + 100 x4 FOR JP-8						JP8	+100	X4	
COLOR (7 DAYS)	C1	C1	C1	C1	C1	C1	С	C1	C	C1	C	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	98	140	228	141	744	398	108	39	248	131	912	410	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

MATERIAL

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =Not Evaluated;

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT NSR =No Spec. Req. and/or 4 (x) Additive Concentration L. PERKINS A.F. AUT. W./MLSA:

A.F. AUT. WL/POSF S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists **Between Material Degradation and Fuel Properties Degradation**

EVALUATION OF TEST RESULTS

NE

MATERIAL / IDENTITY: 6061-T6 ALUMINUM (BARE) TEST PLAN I.D. NO. I.M .3 TEST TEMPERATURE (°F) 325 AIRFRAME / FUEL SYSTEM / LINES **USE:**

EXPOSURE TIME (DAYS) 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980

5 JAN 96 93 POSF 2980 + (JP-8 Additives) **TEST DATE START: JP-8 BASELINE FUEL:**

TEST MATERIAL / FUEL EXPOSURE

									E V A	ALUAI	ION O	LIESI	KESULIS	•		
MATERIAL			RESU	JLTS										(OVERAL	L
PROPERTY TESTS	JI	P-8	JP-8	+100	JP8+1	00 (X4)		OBSER	RVATIO	NS ANL	REFI	ERENC	E S	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST								JP8	+100	X4
COLOR	L	L1	L	L1	L	L1								CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND								CN	W	W
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P	Min. Pittin	ıg - All Sampl	es					CN	W	W
AVG. WT. (gms)	5.2574	5.2670	5.2658	5.2655	5.2331	5.2328										
GAIN / LOSS (gms)		+.0096		0003		0003	0003 Conductivity (%IACS) and Hardness Measurements Within Spec.							CN	W	W
MICROSCOPY EVAL.																
	TEST FUEL / MATERIAL EXPOSURE CONTROL FUEL SPEC.									TEC	T DECL	T TC				
FUELS	1			EKIAL E IODS (28 I		(E	P	PRE (NEW) V	S. POST (STE	_	YS @ 325°I	7)	RANGE		T RESU GENERA	
PROPERTY TESTS*							J]	P-8	JP-8	+ 100	JP-8 +	- 100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	С3	C2	С3	C2	С3	С	C2	C	C2	C	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST		L								
PS/M AT 72° F	101	6	409	46	661	355	108	123	248	141	912	555	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										

NE

NE

NE

NE

NOTES:

Al

Mg

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

12

120

NE

NE

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

13

12

NE

NE

Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =

45

38

NE

NE

38

145

NE

NE

160

65

NE

NE

Comparisons: W = Within Allowable Requirement;

90

NE

NE

DATE: 24 APR 98 OT = Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; UTC ENG: CN = ControlJ. LEONE

NE

NE

NE

NE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT

NSR =No Spec. Req. and/or 4 (x) Additive Concentration L. PERKINS A.F. AUT. W./MLSA: A.F. AUT. WL/POSF S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

EVALUATION OF TEST RESULTS

7075-T6 ALUMINUM, CHROMIC ACID ANODIZED TEST PLAN I.D. NO. I.M .4 **MATERIAL / IDENTITY:** 200 AIRFRAME / FUEL SYSTEM / LINES TEST TEMPERATURE (°F) **USE:**

EXPOSURE TIME (DAYS) 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980

8 SEP 94 93 POSF 2980 + (JP-8 Additives) **TEST DATE START: JP-8 BASELINE FUEL:**

TEST MATERIAL / FUEL EXPOSURE

MATERIAL			RESU	JLTS											OVERAL	L
PROPERTY TESTS	JF	·-8	JP-8	+100	JP8+1	.00 (X4)		OBSER	RVATIO	NS AND	REFI	ERENC	E S	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST								JP8	+100	X4
COLOR	L	L	L	L	L	L								CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND								CN	W	W
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P	Min. Pittir	ng (Depth Neg	ligible) On All	Samples -				CN	W	W
AVG. WT. (gms)	2.8542	2.8541	2.7900	2.7899	2.8468	2.8466										
GAIN / LOSS (gms)		0001		0001		0002	Conductiv	ity (%IACS) a	and Hardness	Measurement	s Within Sp	ec.		CN	W	W
MICROSCOPY EVAL.																
		DOD DIE	. / N. (A / D)	EDIAL D	VDOCLID)E	<u> </u>		CONTEDO	T DITET		1	SPEC.	TEC.	T DECL	T TPC
FUELC	11	EST FUE				(E	т	DE (NEW) V	CONTRO		VS @ 2000	7)			T RESU	
FUELS		4 X 7 1	DAY PEK	IODS (28 I	JAYS)		PRE (NEW) VS. POST (STRESSED 7 DAYS @ 200°F) RANGE IP-8								GENERA!	
PROPERTY TESTS*							JP-8 JP-8 + 100 JP-8 + 100 x4 FOR JP								SERVATION	
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN /	JP8	+100	X4
													MAX			
COLOR (7 DAYS)	C1	C1	C1	C1	C1	C1	С	C1	С	C1	С	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
DC/0.6 A/E 520 E	96	148	217	139	684	440	108	39	248	131	912	410	150/600	0	W	W
PS/M AT 72° F	90	140	217	139	004	440	100	39	240	131	912	410	150/000	U	· vv	vv
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE	L	NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =Not Evaluated;

Comparisons: W =DATE: 24 APR 98 Within Allowable Requirement; OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT

NSR =No Spec. Req. and/or 4 (x) Additive Concentration L. PERKINS A.F. AUT. W./MLSA: A.F. AUT. WL/POSF S. A. ANDERSON

Betz Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980

I.M .4 MATERIAL / IDENTITY: 7075-T6 ALUMINUM, CHROMIC ACID ANODIZED TEST PLAN I.D. NO. TEST TEMPERATURE (°F) 325 AIRFRAME / FUEL SYSTEM / LINES **USE: TEST ADDITIVE/FUEL:**

4 OCT 95 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST M	IATERIAL .	FUEL EXP	OSURE		EVALUATION OF TEST 1	RESULTS					
MATERIAL			RESU	JLTS					(OVERAL	Ĺ		
PROPERTY TESTS	JF	·-8	JP-8	+100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCE	\boldsymbol{S}	EV	ALUATI	ON		
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST			JP8	+100	X4		
COLOR	L	L1	L	L1	L	L1	Discoloration- JP-8 Samples Only		OT	OT	OT		
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND			OT	OT	OT		
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P	Minimum Pitting All Samples		OT	OT	OT		
AVG. WT. (gms)	3.6023	3.6029	3.5825	3.5828	3.5980	3.5979							
GAIN / LOSS (gms)		+.0006		+.0003		0001			OT	OT	OT		
MICROSCOPY EVAL.							Samples Not In T6 Condition Prior to Testing						
	T	-		ERIAL E									
FUELS		4 X 7	DAY PER	IODS (28 I	DAYS)		PRE (NEW) VS. POST (STRESSED 7 DAYS @ 325°F)	RANGE	GENERAL				

FUELS	T	TEST FUEL / MATERIAL EXPOSURE 4 X 7 DAY PERIODS (28 DAYS)							CONTRO S. POST (STR	-	YS @ 325°I	7)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C1	С3	C2	С3	С3	С3	С	C2	С	C2	C	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	128	33	350	146	594	422	108	123	248	141	912	555	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Zn	30	28	40	33	44	41	NE		NE		NE			NE	NE	NE
Mg	8	12	30	32	18	6	NE		NE		NE			NE	NE	NE
Cu	18	13	20	21	20	16	NE		NE		NE			NE	NE	NE
Cr	1	2	2	1	1	3	NE		NE		NE			NE	NE	NE

NOTES:

EXPOSURE TIME (DAYS)

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

28

ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =Not Evaluated;

Comparisons: W = Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

Not applicable; N/A =CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT

NSR =No Spec. Req. and/or 4 (x) Additive Concentration L. PERKINS A.F. AUT. W./MLSA: A.F. AUT. WL/POSF S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

EVALUATION OF TEST RESULTS

7075-T6 ALUMINUM, ALODINE, 1200/IRIDITE/4 TEST PLAN I.D. NO. I.M .5 **MATERIAL / IDENTITY:** TEST TEMPERATURE (°F) 200 AIRFRAME, FUEL SYSTEM **USE:**

EXPOSURE TIME (DAYS) 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980

8 SEP 94 93 POSF 2980 + (JP-8 Additives) **TEST DATE START: JP-8 BASELINE FUEL:**

TEST MATERIAL / FUEL EXPOSURE

MATERIAL			RESU	JLTS										(OVERAL	L
PROPERTY TESTS	JP	·-8	JP-8	+100	JP8+1	00 (X4)		OBSER	RVATIO	NS AND	REFI	ERENC	E S	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST								JP8	+100	X4
COLOR	L	L1	L	L1	L	L1								CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND								CN	W	W
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P	Minimum	Pitting (Dept	h Negligible) -	All Samples				CN	W	W
AVG. WT. (gms)	2.6961	2.6958	2.6915	2.6917	2.7193	2.7192										
GAIN / LOSS (gms)		0003		+.0002		0001	Conductiv	ity (%IACS)	and Hardness	Measuremen	ts Within S _l	pecification		CN	W	W
MICROSCOPY EVAL.																
	nn	COT DITE	T / N/LATE	ERIAL E	VDOCITO	Tr.			CONTRO	T DITET	-	<u> </u>	SPEC.	TEE	T DECL	TTC
FUELS	1.1	-		EKIAL E IODS (28 I		Œ	CONTROL FUEL PRE (NEW) VS. POST (STRESSED 7 DAYS @ 200°F) RANGE								ST RESU GENERAL	
		4 A / I	DAIPEK	IODS (28 L	JA 15)		Min (d2									
PROPERTY TESTS*		20		20		- 20	JP-8 JP-8 + 100 JP-8 + 100 x4 FOR JP-8								ERVATION	
	7	28	7	28	7	28	28 PRE POST PRE POST PRE POST MIN /					MIN / MAX	JP8	+100	X4	
COLOR (FRANCI)	C1	C1	C1	C1	C1	C1	C	C1	С	C1	С	C1	MAX	w	w	w
COLOR (7 DAYS)	CI	CI	CI	CI	CI	CI	C	CI	C	CI	·	CI		· · ·	· vv	vv
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	95	152	216	144	674	436	108	39	248	131	912	410	150/600	W	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =Not Evaluated;

Comparisons: W =

DATE: 24 APR 98 Within Allowable Requirement; OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

Not applicable;

N/A =CN = ControlUTC ENG: J. LEONE GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT

NSR =No Spec. Req. and/or 4 (x) Additive Concentration L. PERKINS A.F. AUT. W./MLSA: A.F. AUT. WL/POSF S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

I.M .5 **MATERIAL / IDENTITY:** 7075-T6 ALUMINUM, ALODINE, 1200/IRIDITE/4 TEST PLAN I.D. NO. TEST TEMPERATURE (°F) 325 AIRFRAME, FUEL SYSTEM **USE:**

EXPOSURE TIME (DAYS) 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980

4 OCT 95 93 POSF 2980 + (JP-8 Additives) **TEST DATE START: JP-8 BASELINE FUEL:**

		TEST N	MATERIAL	/ FUEL EXI	POSURE				EVA	ALUAT	ION O	F TEST	RESULTS	5		
MATERIAL			RESU	ULTS											OVERAL	Ĺ
PROPERTY TESTS	JI	?-8	JP-8	+100	JP8+1	100 (X4)		OBSER	RVATIO	NS ANI	REFI	ERENC	E S	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST								JP8	+100	X4
COLOR	L	L	L	L	L	L								CN	OT	ОТ
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND								CN	OT	OT
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P	Pitting - A	All Samples						OT	OT	OT
AVG. WT. (gms)	3.5828	3.5837	3,5845	3.5852	3.5692	3.5692										
GAIN / LOSS (gms)		+.0009		+.0007		.0000	Conductiv	ity (%IACS)		CN	OT	OT				
MICROSCOPY EVAL.							Condition by (101100) and includes 101110 per									
51151.0	T			ERIAL E		RE		DE ALIA	CONTRO		VC ⊕ 2250	7)	SPEC.		T RESU	
FUELS		4 X 7	DAY PER	IODS (28 I	DAYS)		ŀ	RE (NEW) V	S. POST (STE	KESSED 7 DA	115 @ 3251	!)	RANGE	'	GENERA	L
PROPERTY TESTS*							J	P-8	JP-8	+ 100	JP-8 +	- 100 x4	FOR JP-8	OBS	SERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN /	JP8	+100	X4
									MAX							
COLOR (7 DAYS)	C2	C2	C3	С3	С3	C3	С	C2		W	W	W				
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
DOME AND TO	120		254	20	F0F	254	100	100	240	1.41	012		150/600		_	**7

																i
PS/M AT 72° F	129	3	354	38	587	254	108	123	248	141	912	555	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Pb	1	2	7	3	8	4	NE		NE		NE			NE	NE	NE
Zn	ND	NE	41	NE	39	NE	NE		NE		NE			NE	NE	NE
Mg	4	NE	60	NE	19	NE	NE		NE		NE			NE	NE	NE
Cr	1	2	1	1	8	86	NE		NE		NE			NE	NE	NE

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =

Comparisons: W =Within Allowable Requirement;

DATE: OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT

NSR =No Spec. Req. and/or 4 (x) Additive Concentration L. PERKINS A.F. AUT. W./MLSA: A.F. AUT. WL/POSF S. A. ANDERSON

TEST ADDITIVE/FUEL:

I.M .6 **MATERIAL / IDENTITY:** 7075-T6 ALUMINUM (BARE) TEST PLAN I.D. NO. TEST TEMPERATURE (°F) 200 AIRFRAME, FUEL SYSTEM **USE:**

Betz Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 8 SEP 94 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST M	IATERIAL /	FUEL EXF	POSURE		EVALUATION OF TEST RESULTS	5		
MATERIAL				JLTS				•	OVERAL	L
PROPERTY TESTS					JP8+10	00 (X4)	OBSERVATIONS AND REFERENCES	EV	ALUATION	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L	L	L	L	L		CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P	Minimum Localized Pitting (Depth Negligible) - All Samples	CN	W	W
AVG. WT. (gms)	2.7953	2.7952	2.8076	2.8074	2.7924	2.7920				
GAIN / LOSS (gms)		0001		0002		0004	Conductivity (%IACS) and Hardness Within Specification	CN	W	W
MICROSCOPY EVAL.										

FUELS	T	EST FUE		ERIAL E IODS (28 I		RE	P		CONTRO S. POST (STR	_	YS @ 200°I	7)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	SERVATION	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C1	C1	C1	C1	C1	C1	С	C1	С	C1	С	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	103	145	223	149	668	427	108	39	248	131	912	410	150/600	W	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

EXPOSURE TIME (DAYS)

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

28

Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT

NSR =No Spec. Req. and/or 4 (x) Additive Concentration L. PERKINS A.F. AUT. W./MLSA:

A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. I.M.6 MATERIAL / IDENTITY: 7075-T6 ALUMINUM (BARE)
TEST TEMPERATURE (°F) 325 USE: AIRFRAME, FUEL SYSTEM

EXPOSURE TIME (DAYS) 28 TEST ADDITIVE/FUEL: Betz Dearborn 8Q462 Normal and x4 Concentrations) / 93 POSF 2980

TEST DATE START: 4 OCT 95 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

	ı	mean s		/			ll l									
		TEST	MATERIAL	/ FUEL EXP	OSURE				EVA	LUAT	ION O	F TEST	RESULTS	3		
MATERIAL			RES	ULTS										(OVERAL	ւ
PROPERTY TESTS	JP	'-8	JP-	8 +100	JP8+1	00 (X4)		OBSER	VATIO	NS ANI	REF	ERENC	E S	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST								JP8	+100	X4
COLOR	L	L1	L	L	L	L									OT	OT
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND									OT	OT
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P									OT	OT
AVG. WT. (gms)	NE	NE	NE	NE	NE	NE	<i>5</i> 1									
GAIN / LOSS (gms)		NE		NE		NE	Conductiv	vity (%IACS)	and Hardness	not in Spec				CN	OT	OT
MICROSCOPY EVAL.																
FUELS	Т	-		ERIAL E		E	CONTROL FUEL PRE (NEW) VS. POST (STRESSED 7 DAYS @ 70°F) SPEC. RANGE								T RESU GENERA	
PROPERTY TESTS*							JP-8 JP-8 + 100 JP-8 + 100 x4 FOR JP-5							OBS	ERVATI	ONS
	7	28	7	28	7	28								JP8	+100	X4

PROPERTY TESTS							AT.	-0	J1 -0 ·	T 100	31 -0 1	100 X-	FOR JI -0	ODS	EKVALI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	NE	NE	NE	C	C2	C	C2	C	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	NE	NE	NE	NE	NE	NE	108	123	248	141	912	555	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Al	33	20	120	110	190	180	NE		NE		NE			NE	NE	NE
Zn	10	28	40	18	35	15	NE		NE		NE			NE	NE	NE
Mg	18	20	23	90	50	16	NE		NE		NE			NE	NE	NE
Cu	10	19	90	21	18	16	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L = Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W = Within Allowable Requirement; DATE: <u>24 APR 98</u>

OT = Material Tested Beyond Temperature Range O = Outside Allowable Requirement UDRI TECH: A. BEHME
N/A = Not applicable; CN = Control UTC ENG: J. LEONE

N/A = Not applicable; CN = Control UTC ENG: J. LEONE

GT = Greater than 500 ppb UDRI P.I. ENG: D.H. KALT

NSR = No Spec. Req. and/or 4 (x) Additive Concentration

A.F. AUT. W./MLSA:

L. PERKINS

A.F. AUT. WL/POSF
S. A. ANDERSON

EVALUATION OF TEST RESULTS

2024-T3 ALUMINUM (BARE) TEST PLAN I.D. NO. I.M .7 **MATERIAL / IDENTITY:** TEST TEMPERATURE (°F) 200 AIRFRAME, FUEL SYSTEM **USE:**

EXPOSURE TIME (DAYS) 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 8 SEP 94 93 POSF 2980 + (JP-8 Additives) **TEST DATE START: JP-8 BASELINE FUEL:**

TEST MATERIAL / FUEL EXPOSURE

						EVALUATION OF TEST RES							KESCLIS	,		
MATERIAL	JF	• Q	RESI	ULTS +100	TDQ : 1	00 (X4)		ODCEI	NATIO	NG AND	DEEL	EDENG	E C		OVERAL	
PROPERTY TESTS				1				OBSER	RVATIO	VS AND	KEFI	EKENCI	E S		VALUATION	
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST								JP8	+100	X4
COLOR	L	L	L	L	L	L	Localized I	Discoloration	On JP-8 Samp	le				CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND								CN	W	W
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P	Minimum	Pitting (Deptl	Negligible) - A	All Samples				CN	W	W
AVG. WT. (gms)	2.9438	2.9435	2.8987	2.8985	2.9030	2.9029									<u> </u>	
GAIN / LOSS (gms)		0003		0002		0001	Conductivi	ity (%IACS) a	and Hardness	Measurement	s Within Sp	ecification		CN	W	W
MICROSCOPY EVAL.																
FUELS	T	EST FUE		ERIAL E	0.00_	RE	P		ST RESU							
PROPERTY TESTS*				·	,		.11	P-8	.JP-8 -	- 100	.IP-8 +	- 100 x4	FOR JP-8	OBS	SERVATIO	ONS
TROTERTT TESTS	7	28	7	28	7	28	PRE POST PRE POST PRE POST M						MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C1	C1	C1	C1	C1	C1	С	C1	C	C1	С	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	79	53	221	147	724	382	108	39	248	131	912	410	150/600	О	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	E NE NE NE							NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

P = Pitting**Designations:** NE =Not Evaluated; ND = Not Detected; BD = Below Detection

Comparisons: W = Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

Not applicable; N/A =CN = ControlUTC ENG: J. LEONE GT =

Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT NSR =No Spec. Req. and/or 4 (x) Additive Concentration L. PERKINS A.F. AUT. W./MLSA:

A.F. AUT. WL/POSF S. A. ANDERSON

MATERIAL / IDENTITY: 2024-T3 ALUMINUM (BARE) TEST PLAN I.D. NO. I.M .7 TEST TEMPERATURE (°F) 325 AIRFRAME, FUEL SYSTEM **USE:**

EXPOSURE TIME (DAYS) 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 5 JUN 96 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST M	IATERIAL /	FUEL EXF	POSURE		EVALUATION OF TEST RESULTS			
MATERIAL			RESU	JLTS				(OVERAL	L
PROPERTY TESTS	JP-8 JP-8 +100 JP8+100 (X4) PRE POST PRE POST						OBSERVATIONS AND REFERENCES	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L1	L	L1	L	L1		CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P	Minimum Pitting - All Samples	CN	W	W
AVG. WT. (gms)	5.6366	5.6373	5.6494	5.6496	5.5251	5.5250				
GAIN / LOSS (gms)		+.0007		+.0002		0001	Conductivity (%IACS) and Hardness Measurements Within Specification	CN	W	W
MICROSCOPY EVAL.										

FUELS	TI	-		ERIAL E IODS (28 D		RE	P		CONTRO S. POST (STR	_	YS @ 325°I	?)	SPEC. RANGE		ST RESU GENERAL	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	SERVATIO	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C1	C1	C1	C1	C1	C1	С	C2	C	C2	C	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	79	53	221	147	724	382	108	123	248	141	912	555	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Al	24	18	13	85	40	117	NE		NE		NE			NE	NE	NE
Mg	40	21	90	51	150	50	NE		NE		NE			NE	NE	NE
Cu	4	8	9	11	6	12	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =Not Evaluated;

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

Not applicable; N/A =CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT

NSR =No Spec. Req. and/or 4 (x) Additive Concentration L. PERKINS A.F. AUT. W./MLSA: A.F. AUT. WL/POSF S. A. ANDERSON

I.M.8 MATERIAL / IDENTITY: ALUMINUM (BARE) 2219-T87 TEST PLAN I.D. NO. TEST TEMPERATURE (°F) 200 AIRFRAME, FUEL SYSTEM **USE:**

EXPOSURE TIME (DAYS) 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) / 93 POSF 2980

5 DEC 96 **92 POSF 2926 + (JP-8 Additives) TEST DATE START:** JP-8 BASELINE FUEL:

		TEST N	MATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST	RESULTS	5		
MATERIAL			RES	ULTS					(OVERAL	L
PROPERTY TESTS	JF	P-8	JP-	8 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENC.	E S	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST			JP8	+100	X4
COLOR	L	L1	L	L1	L	L1	Localized Surface Deposits All Samples		CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND			CN	W	W
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P	Pitting All Samples		CN	W	W
AVG. WT. (gms)	6.3335	6.3326	6.3354	6.3347	6.3406	6.3397					
GAIN / LOSS (gms)		0009		0007		0009	Conductivity (%IACS) and Hardness Within Spec		CN	W	W
MICROSCOPY EVAL.											
FUELS	Т	TEST FUEL / MATERIAL EXPOSURE 4 X 7 DAY PERIODS (28 DAYS)					CONTROL FUEL PRE (NEW) VS. POST (STRESSED 7 DAYS @ 70°F)	SPEC. RANGE	-	T RESU	

FUELS	Т			ERIAL E		E	P		CONTRO S. POST (STI	_	YS @ 70°F	r)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JP	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C1	C1	C1	C1	C1	C1	С	C1	C	C1	С	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	229	106	573	303	845	870	100	66	656	114	1070	59	150/600	0	0	0
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L =L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =Not Evaluated;

Comparisons:

W =DATE: 24 APR 98 Within Allowable Requirement; OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

Not applicable; N/A =CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT

NSR =No Spec. Req. and/or 4 (x) Additive Concentration L. PERKINS A.F. AUT. W./MLSA: A.F. AUT. WL/POSF S. A. ANDERSON

I.M .8 **MATERIAL / IDENTITY:** 2219-T87 ALUMINUM (BARE) TEST PLAN I.D. NO. TEST TEMPERATURE (°F) 325 AIRFRAME, TANK AND PLUMBING **USE:**

EXPOSURE TIME (DAYS) 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980

3 MAR 95 93 POSF 2980 + (JP-8 Additives) TEST DATE START: JP-8 BASELINE FUEL:

		TEST M	IATERIAL /	FUEL EXP	OSURE				EVA	ALUAT	ION OF	TEST	RESULTS	5		
MATERIAL			RESU	JLTS										(OVERAL	L
PROPERTY TESTS	JI	P-8	JP-8	+100	JP8+1	.00 (X4)		OBSER	RVATIO	NS ANL	REFE	RENC	ES	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST								JP8	+100	X4
COLOR	L	L	L	L	L	L			CN	OT	OT					
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND			CN	OT	OT					
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P	Pitting - A		CN	OT	OT					
AVG. WT. (gms)	5.8356	5.8369	5.8394	5.8501	5.7949	5.7951										
GAIN / LOSS (gms)		+.0013		+.0107		+.0002	Conductivi	ty (%IACS) a	and hardness	not in Spec				CN	OT	OT
MICROSCOPY EVAL.																
FUELS	T			ERIAL E		RE	P		CONTRO S. POST (STE		AYS @ 325°F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JP	'-8	FOR JP-8	OBS	ERVATI	ONS				
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN /	JP8	+100	X4

COLOR (7 DATS)	Ü-	.	٥.	0.		٥.	Ü	02	Č		Ü	-		Ü	Ü	ı
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	149	47	258	114	560	376	50	4	300	57	569	241	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Cu	ND	ND	ND	ND	ND	ND	NE		NE		NE			NE	NE	NE
Pb	<100	ND	<100	ND	<100	ND	NE		NE		NE			NE	NE	NE
Sn	ND	ND	ND	ND	ND	ND	NE		NE		NE			NE	NE	NE

NE

NOTES:

COLOR (7 DAYS)

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

NE

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

NE

Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =

NE

NE

NE

Comparisons: W =Within Allowable Requirement;

NE

DATE: OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

Not applicable; N/A =CN = ControlUTC ENG: J. LEONE

NE

NE

MAX

NE

NE

NE

GT =Greater than 500 ppb LT = Less than 500 ppb**UDRI P.I. ENG:** D.H. KALT

NSR =No Spec. Req. and/or 4 (x) Additive Concentration L. PERKINS A.F. AUT. W./MLSA: A.F. AUT. WL/POSF S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

EVALUATION OF TEST RESULTS

I.M .9 **MATERIAL / IDENTITY:** 3003 ALUMINUM (BARE) TEST PLAN I.D. NO.

TEST MATERIAL / FUEL EXPOSURE

TEST TEMPERATURE (°F) 200 AIRFRAME, TANK AND PLUMBING **USE: EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980

1 DEC 94 93 POSF 2980 + (JP-8 Additives) **TEST DATE START: JP-8 BASELINE FUEL:**

MATERIAL			RESU	JLTS										(OVERAL	L
PROPERTY TESTS	JI	?-8	JP-8	+100	JP8+1	.00 (X4)		OBSER	RVATIO	NS AND	REF	ERENC	E S	EV	VALUATIO	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST								JP8	+100	X4
COLOR	L	L1	L	L1	L	L1								CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND								CN	W	W
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P	Minimum	Pitting (Deptl	n Negligible) -	All Samples				CN	W	W
AVG. WT. (gms)	5.5418	5.5416	5.5324	5.5324	5.5175	5.5172										
GAIN / LOSS (gms)		0002		.0000		0003	Conductiv	ity (%IACS) a	and Hardness	Measurement	s Within Sp	ecifications		CN	W	W
MICROSCOPY EVAL.																
							- I		~~		<u>-</u>		are a			
	T.	EST FUE				КE		DE AIRIN I	CONTRO	-	**C C 2000	ń	SPEC.		ST RESU	
FUELS		4 X 7	DAY PER	IODS (28 I	DAYS)		1	PRE (NEW) V	S. POST (STR	ESSED 7 DA	YS @ 200°1	(1)	RANGE	(GENERA	L
PROPERTY TESTS*							J.	P-8	JP-8	+ 100	JP-8 -	- 100 x4	FOR JP-8	OBS	SERVATION	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C1	C1	C1	C1	C1	C1	C	C1	С	C1	C	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	34	29	234	144	692	396	47	64	304	194	569	440	150/600	О	О	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =Not Evaluated;

Comparisons: W = Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT

NSR =No Spec. Req. and/or 4 (x) Additive Concentration L. PERKINS A.F. AUT. W./MLSA: A.F. AUT. WL/POSF S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

I.M .9 **MATERIAL / IDENTITY:** 3003 ALUMINUM (BARE) TEST PLAN I.D. NO. TEST TEMPERATURE (°F) 325 AIRFRAME, TANK AND PLUMBING **USE:**

EXPOSURE TIME (DAYS) 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980

5 JAN 96 93 POSF 2980 + (JP-8 Additives) **TEST DATE START: JP-8 BASELINE FUEL:**

		TEST M	IATERIAL	/ FUEL EXI	POSURE				EVA	ALUAT	ION O	F TEST	RESULTS	5		
MATERIAL			RESU	ULTS											OVERAL	L
PROPERTY TESTS	JF	?-8	JP-8	+100	JP8+1	100 (X4)	1	OBSER	RVATIO	NS ANI	REFI	ERENC	E S	E	VALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST								JP8	+100	X4
COLOR	L	L1	L	L1	L	L1								CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND								CN	W	W
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P	5111 Thinking in compact							CN	W	W
AVG. WT. (gms)	3.5168	3.5179	3.5278	3.5281	3.5110	3.5111										
GAIN / LOSS (gms)		+.0011		+.0003		+.0001								CN	W	W
MICROSCOPY EVAL.							001 Conductivity (%IACS) and Hardness Measurements Within Specifications									
FUELS	T			ERIAL E IODS (28 I		RE	P	PRE (NEW) V	CONTRO	-	YS @ 325°I	F)	SPEC. RANGE		ST RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	- 100 x4	FOR JP-8	OB	SERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C2	C2	С3	C2	С3	С	C2	C	C2	C	C2		W	W	W
														l———		

CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	101	25	390	133	671	438	108	123	248	141	912	555	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Al	5	14	12	64	15	154	NE		NE		NE			NE	NE	NE
Mn	ND	ND	ND	ND	ND	ND	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT

NSR =No Spec. Req. and/or 4 (x) Additive Concentration L. PERKINS A.F. AUT. W./MLSA:

A.F. AUT. WL/POSF S. A. ANDERSON

EVALUATION OF TEST RESULTS

OVERALL

TEST PLAN I.D. NO. **MATERIAL / IDENTITY:** I.M .10 / II.M .19 A 355 - T6 CAST ALUMINUM TEST TEMPERATURE (°F) 200 AIRFRAME, FUEL SYSTEM USE:

EXPOSURE TIME (DAYS) 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

TEST DATE START: 15 DEC 94 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

TDQ - 100 (V4)

TEST MATERIAL / FUEL EXPOSURE

RESULTS

PROPERTY TESTS	JF	·-8	JP-8	+100	JP8+1	00 (X4)		OBSER	RVATIO	NS ANL	REFI	ERENC	E S	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST								JP8	+100	X4
COLOR	L	L1	L	L1	L	L1	Minimum	Discoloration	All Samples					CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND								CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND								CN	W	W
AVG. WT. (gms)	1.0375	1.0374	1.0715	1.0715	1.0583	1.0581										1
GAIN / LOSS (gms)		0001		.0000		0002								CN	W	W
MICROSCOPY EVAL.							Conductiv	ity (%IACS)	and Hardness	Within Speci	fication					1
FUELS	T			ERIAL E IODS (28 I		RE	F	PRE (NEW) V	CONTRO S. POST (STE	-	AYS @ 200°I	?)	SPEC. RANGE		ST RESU GENERAI	
PROPERTY TESTS*							J	P-8	JP-8	+ 100	JP-8 +	- 100 x4	FOR JP-8	OBS	SERVATIO	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C2	C1	C2	C1	C2	С	C1	С	C1	C	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	31	33	238	139	682	404	47	64	304	194	569	440	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY		1								
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

MATERIAL

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

Not applicable; CN = Control

N/A =UTC ENG: J. LEONE GT =Greater than 500 ppb LT = Less than 500 ppb**UDRI P.I. ENG:** D.H. KALT

No Spec. Req. and/or 4 (x) Additive Concentration NSR =A.F. AUT. W./MLSA:

L. PERKINS A.F. AUT. WL/POSF S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. MATERIAL / IDENTITY: A 356 - T6 CAST ALUMINUM I.M .11 / II.M .20 TEST TEMPERATURE (°F) 200 AIRFRAME, FUEL SYSTEM USE:

EXPOSURE TIME (DAYS) 28 TEST ADDITIVE/FUEL: Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

TEST DATE START: 15 DEC 94 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST M	IATERIAL .	FUEL EXF	POSURE				EVA	ALUAT	ION O	F TEST	RESULTS	3		
MATERIAL			RESU	JLTS										(OVERAL	L
PROPERTY TESTS	JI	P-8	JP-8	+100	JP8+1	00 (X4)		OBSER	RVATIO	NS ANL	REFI	ERENC	E S	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST								JP8	+100	X4
COLOR	L	L1	L	L1	L	L1	Discolora	tion All sampl	es					CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND								CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND								CN	W	W
AVG. WT. (gms)	.9317	.9317	.9738	.9738	1.0182	1.0179										
GAIN / LOSS (gms)		.0000		.0000		0003								CN	W	W
MICROSCOPY EVAL.							Hardness	and Conducti	vity Within S _l	pecification						
FUELS	T	EST FUE 4 X 7		ERIAL E IODS (28 I		RE	I	PRE (NEW) V	CONTRO S. POST (STE		YS @ 200°1	₹)	SPEC. RANGE		ST RESU GENERA	
PROPERTY TESTS*							.I	P-8	JP-8	+ 100	JP-8 +	- 100 x4	FOR JP-8	OBS	SERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C2	C1	C2	C1	C1	С	C1	С	C1	C	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	33	34	242	125	686	403	47	64	304	194	569	440	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Al	NE	NE	NE	NE	NE	NE										

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

Not applicable; CN = Control

N/A =UTC ENG: J. LEONE GT =Greater than 500 ppb LT = Less than 500 ppb**UDRI P.I. ENG:** D.H. KALT

NSR =No Spec. Req. and/or 4 (x) Additive Concentration

A.F. AUT. W./MLSA: L. PERKINS A.F. AUT. WL/POSF S. A. ANDERSON Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. MATERIAL / IDENTITY: **ALUMINUM BARS 7050-T7451** I.M.12 TEST TEMPERATURE (°F) 200 AIRFRAME, FUEL SYSTEM USE: **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) / 93 POSF 2980 92 POSF 2926 + (JP-8 Additives) **TEST DATE START:** 5 DEC 96 JP-8 BASELINE FUEL:

		TEST N	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	5		
MATERIAL			RES	ULTS				(OVERALI	L
PROPERTY TESTS	JP	·-8	JP-	8 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L1	L	L1	L	L1	Minimum Discoloration/Deposits All Samples	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	6.1950	6.1949	6.2860	6.2856	6.2352	6.2347				
GAIN / LOSS (gms)		0001		0004		0005		CN	W	W
MICROSCOPY EVAL.										1

FUELS	Т			ERIAL EX IODS (28 D		E	P		CONTRO S. POST (STI		AYS @ 70°F	")	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JF	'-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C1	C1	C1	C1	C1	C1	С	C1	С	C1	С	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	223	105	577	290	851	795	108	66	656	114	1040	59	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement;

> OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** N/A =Not applicable; CN = ControlUTC ENG:

GT =Greater than 500 ppb

LT = Less than 500 ppbNSR =No Spec. Req. and/or 4 (x) Additive Concentration

A.F. AUT. W./MLSA: L. PERKINS A.F. AUT. WL/POSF S. A. ANDERSON Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

DATE:

UDRI P.I. ENG:

24 APR 98

A. BEHME

J. LEONE

D.H. KALT

Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. MATERIAL / IDENTITY: 316, STAINLESS STEEL I.M .13 / II.M .13 TEST TEMPERATURE (°F) 200 AIRFRAME, FUEL SYSTEM USE: **EXPOSURE TIME (DAYS)** 28 TEST ADDITIVE/FUEL: Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

TEST DATE START: 8 SEP 94 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST M	ATERIAL /	FUEL EXF	POSURE		EVALUATION OF TEST RESULTS	5		
MATERIAL			RESU	JLTS				(OVERALI	L
PROPERTY TESTS	JP	-8	JP-8	+100	JP8+10	00 (X4)	OBSERVATIONS AND REFERENCES	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L	L	L	L	L		CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	14.7461	14.7462	14.6602	14.6597	14.7572	14.7567				
GAIN / LOSS (gms)		+.0001		0005		0005		CN	W	W
MICROSCOPY EVAL.										

FUELS	T	EST FUE 4 X 7		ERIAL E IODS (28 I		RE	P		CONTRO S. POST (STR	_	YS @ 200°I	?)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	SERVATION	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C2	C1	C2	C1	C1	С	C1	С	C1	C	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	33	34	242	125	686	403	108	39	248	131	912	410	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Cr	NE	NE	NE	20	NE	NE	NE		NE		NE			NE	NE	NE
Fe	NE	NE	NE	50	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME J. LEONE

N/A =Not applicable; CN = ControlUTC ENG:

GT =Greater than 500 ppb LT = Less than 500 ppbUDRI P.I. ENG: D.H. KALT No Spec. Req. and/or 4 (x) Additive Concentration NSR =A.F. AUT. W./MLSA: L. PERKINS

A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. **MATERIAL / IDENTITY:** 321, STAINLESS STEEL I.M .14 / II.M .14

200 **USE:** AIRFRAME, ENGINE FUEL SYSTEM TEST TEMPERATURE (°F) **EXPOSURE TIME (DAYS)** 28 TEST ADDITIVE/FUEL: Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

TEST DATE START: 8 SEP 94 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST M	ATERIAL /	FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	;		
MATERIAL PROPERTY TESTS	JP	-8	RESU JP-8	JLTS +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES		OVERALI ALUATIO	
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L1	L	L1	L	L1		CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND	Corrosion Forming in Surface Crevices (Crevices Formed During Rolling Operation	CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND	of Sheet Material) - All Samples	CN	W	W
AVG. WT. (gms)	19.2690	19.2693	19.4725	19.4720	19.4609	19.4604				
GAIN / LOSS (gms)		+.0003		0005		0005		CN	W	W
MICROSCOPY EVAL.										

51151.0	T	-		ERIAL E		RE	n		CONTRO		VC @ 2000T	7)	SPEC.		T RESU	
FUELS PROPERTY TESTS*		4 X 7 1	DAY PER	IODS (28 I	DAYS)			P-8	S. POST (STR			100 x4	RANGE FOR JP-8		GENERAI SERVATIO	
PROPERTY TESTS	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN /	JP8	+100	X4
													MAX			
COLOR (7 DAYS)	C1	C1	C1	C1	C1	C1	С	C1	C	C1	С	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	72	36	226	136	679	433	108	39	248	131	912	410	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Cr	NE	NE	NE	<5	NE	NE	NE		NE		NE			NE	NE	NE
Fe	NE	NE	NE	10	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ C1 - C6 = Light to Dark Clear

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

W =**Comparisons:** Within Allowable Requirement;

DATE: 24 APR 98 OT = Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE

UDRI P.I. ENG: GT =Greater than 500 ppb LT = Less than 500 ppbD.H. KALT

NSR =No Spec. Req. and/or 4 (x) Additive Concentration A.F. AUT. W./MLSA: L. PERKINS A.F. AUT. WL/POSF S. A. ANDERSON_

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists **Between Material Degradation and Fuel Properties Degradation**

TEST PLAN I.D. NO. MATERIAL / IDENTITY: 304, STAINLESS STEEL I.M .15 / II.M .12 TEST TEMPERATURE (°F) 200 AIRFRAME, FUEL SYSTEM USE: **EXPOSURE TIME (DAYS)** 28 TEST ADDITIVE/FUEL: Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

8 SEP 94 **TEST DATE START:** JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST M	IATERIAL .	FUEL EXP	POSURE		EVALUATION OF TEST RESULTS	5		
MATERIAL			RESU	JLTS					OVERAL	.L
PROPERTY TESTS	JP	-8	JP-8	+100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	EV	VALUATIO	.ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L1	L	L1	L	L1		CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND	Corrosion Forming in Surface Crevices (Crevices Formed During Rolling Operation	CN	W	W
AVG. WT. (gms)	15.3242	15.3241	15.4429	15.4425	15.5630	15.5626	of Sheet Material) - All Samples			
GAIN / LOSS (gms)		0001		0004		0004		CN	W	W
MICROSCOPY EVAL.										

FUELS	T	EST FUE 4 X 7		ERIAL E IODS (28 I		RE	P		CONTRO S. POST (STR		YS @ 200°I	")	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JI	?-8	JP-8 -	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	SERVATION TO SERVA	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C1	C1	C1	C1	C1	C1	С	C1	С	C1	С	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	68	38	226	145	720	422	108	39	248	131	912	410	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY		1				1				
Fe	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
Cr	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
Ni	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons:

W =Within Allowable Requirement; DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE GT =Greater than 500 ppb LT = Less than 500 ppb**UDRI P.I. ENG:** D.H. KALT

No Spec. Req. and/or 4 (x) Additive Concentration NSR =A.F. AUT. W./MLSA: L. PERKINS

A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. MATERIAL / IDENTITY: **INCO 718, NICKEL** I.M .16 / II.M .6 TEST TEMPERATURE (°F) 200 AIRFRAME, FUEL SYSTEM USE: **EXPOSURE TIME (DAYS)** 28 TEST ADDITIVE/FUEL: Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980 **TEST DATE START:** 1 DEC 94 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST M	ATERIAL /	FUEL EXF	OSURE		EVALUATION OF TEST RESULTS			
MATERIAL PROPERTY TESTS	JP	-8	RESU JP-8	JLTS +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES		OVERALI 'ALUATIO	
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L	L	L	L	L		CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	16.1558	16.1559	16.0695	16.0693	16.3168	16.3166				
GAIN / LOSS (gms)		+.0001		0002		0002		CN	W	W
MICROSCOPY EVAL.										

FUELS	TI	EST FUE		ERIAL E IODS (28 I		RE	P		CONTRO S. POST (STR		YS @ 200°I	()	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	SERVATION	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C1	C1	C1	C1	C1	C1	С	C1	C	C1	С	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	32	26	228	167	681	389	47	64	304	194	569	440	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement;

DATE: _24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** _A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb**UDRI P.I. ENG:**

D.H. KALT NSR =No Spec. Req. and/or 4 (x) Additive Concentration A.F. AUT. W./MLSA: L. PERKINS

A.F. AUT. WL/POSF S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

UTC ENG:

A.F. AUT. WL/POSF

J. LEONE

S. A. ANDERSON

TEST ADDITIVE/FUEL:

TEST PLAN I.D. NO. **MATERIAL / IDENTITY:** 440C STAINLESS STEEL I.M .17 / II.M .11 TEST TEMPERATURE (°F) 200 AIRFRAME, FUEL SYSTEM USE:

TEST DATE START: 2 MAR 95 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST M	ATERIAL /	FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	5		
MATERIAL			RESU	JLTS				(OVERAL	L
PROPERTY TESTS	JP	-8	JP-8	+100	JP8+10	00 (X4)	OBSERVATIONS AND REFERENCES	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L	L	L	L	L	Localized Discoloration - All Samples	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	25.4133	25.4118	25.4144	25.4150	25.4802	25.4808				
GAIN / LOSS (gms)		0015		+.0006		+.0006		CN	W	W
MICROSCOPY EVAL.										

FUELS	T	EST FUE 4 X 7		ERIAL E IODS (28 I		RE	P	PRE (NEW) V	CONTRO S. POST (STR	_	YS @ 200°I	·)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	SERVATIO	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C2	C1	C1	C1	C1	С	C1	С	C1	С	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	171	56	288	304	663	493	108	39	248	131	912	410	150/600	W	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Cr	<10	<10	<10	<10	<10	<10	NE		NE		NE			NE	NE	NE
Fe	20	60	35	35	15	80	NE		NE		NE			NE	NE	NE
Mo	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

EXPOSURE TIME (DAYS)

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

28

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = Control

GT =Greater than 500 ppb LT = Less than 500 ppb**UDRI P.I. ENG:** D.H. KALT No Spec. Req. and/or 4 (x) Additive Concentration NSR =A.F. AUT. W./MLSA: L. PERKINS

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. I.M .18 / II.M .8 **MATERIAL / IDENTITY:** 347 STAINLESS STEEL TEST TEMPERATURE (°F) 200 AIRFRAME, FUEL SYSTEM USE: **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980 **TEST DATE START:** 8 SEP 94 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

TEST MATERIAL / FUEL EXPOSURE **EVALUATION OF TEST RESULTS** RESULTS OVERALL MATERIAL JP-8 JP-8 +100 JP8+100 (X4) PROPERTY TESTS **EVALUATION** OBSERVATIONS AND REFERENCES PRE POST PRE POST PRE POST JP8 +100 X4 (AVG. 5 SPECIMENS) L L1 L1 L1 CN W W COLOR L L ND PITTING (VISUAL) ND ND ND ND ND CN W W ND ND ND ND ND ND CN W W PITTING (MICROSCOPY) 16.0541 16.0543 16.0578 16.0575 15.8608 15.8601 AVG. WT. (gms) GAIN / LOSS (gms) +.0002 -.0003 -.0007 CN W W

FUELS	T	EST FUE 4 X 7		ERIAL E IODS (28 I		RE	P		CONTRO S. POST (STR		YS @ 200°I	?)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JI	?-8	JP-8 -	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	SERVATION TO SERVA	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C1	C1	C1	C1	C1	C1	С	C1	С	C1	С	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	79	35	228	132	694	430	108	39	248	131	912	410	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY		1								
Cr	NE	NE	NE	<5	NE	NE	NE		NE		NE			NE	NE	NE
Fe	NE	NE	NE	60	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

MICROSCOPY EVAL.

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement;

OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** N/A =Not applicable; CN = ControlUTC ENG:

GT =Greater than 500 ppb LT = Less than 500 ppb

No Spec. Req. and/or 4 (x) Additive Concentration NSR =A.F. AUT. W./MLSA: L. PERKINS A.F. AUT. WL/POSF S. A. ANDERSON Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

DATE:

UDRI P.I. ENG:

_24 APR 98

A. BEHME

J. LEONE

D.H. KALT

Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. **MATERIAL / IDENTITY: ALLOY 30302, 5688H (AMS), FERROUS** I.M .19 / II.M .10 TEST TEMPERATURE (°F) 200 AIRFRAME, FUEL SYSTEM (LOCKWIRE) USE:

EXPOSURE TIME (DAYS) 28 TEST ADDITIVE/FUEL: Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

93 POSF 2980 + (JP-8 Additives) TEST DATE START: 2 MAR 95 JP-8 BASELINE FUEL:

		TEST M	IATERIAL	FUEL EXI	POSURE		EVALUATION OF TEST	RESULTS	5		
MATERIAL			RESU	JLTS					(OVERAL	L
PROPERTY TESTS	JI	P-8	JP-8	+100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENC.	ES	EV	VALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST			JP8	+100	X4
COLOR	L	L2	L	L2	L	L2	Discoloration All Samples		CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND			CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND			CN	W	W
AVG. WT. (gms)	2.1102	2.1102	2.0031	2.0029	2.1241	2.1240					
GAIN / LOSS (gms)		.0000		0002		0001			CN	W	W
MICROSCOPY EVAL.											
			- /35/50			_	GOVERNOT TELEV	CDEC		TE PROTE	
FUFIS	T	EST FUE 4 X 7	L / MATI DAY PERI			RE	CONTROL FUEL PRE (NEW) VS. POST (STRESSED 7 DAYS @ 200°F)	SPEC. RANGE		ST RESU GENERAI	

FUELS	T			ERIAL E IODS (28 D		RE	P		CONTRO S. POST (STR	-	YS @ 200°I	ř)	SPEC. RANGE		ST RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	SERVATION	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C2	C1	C1	C1	C1	С	C1	С	C1	С	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	162	47	289	234	647	462	108	39	248	131	912	410	150/600	0	W	NSR
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Cr	<10	<10	<10	<10	<10	<10	NE		NE		NE			NE	NE	NE
Ni	<10	<10	<10	<10	<10	<10	NE		NE		NE			NE	NE	NE
Fe	125	35	55	70	60	85	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement; DATE: 24 APR 98 A. BEHME

OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:**

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE GT =Greater than 500 ppb LT = Less than 500 ppb**UDRI P.I. ENG:** D.H. KALT

No Spec. Req. and/or 4 (x) Additive Concentration NSR =A.F. AUT. W./MLSA: L. PERKINS

A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. **MATERIAL / IDENTITY:** 17-4 pH STAINLESS STEEL, AMS 5604/5643 I.M .20 / II.M .24 TEST TEMPERATURE (°F) 200 AIRFRAME, FUEL SYSTEM USE:

EXPOSURE TIME (DAYS) 28 TEST ADDITIVE/FUEL: Betz De arborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

TEST DATE START: 1 DEC 94 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST M	ATERIAL /	FUEL EXP	POSURE		EVALUATION OF TEST RESULTS	5		
MATERIAL			RESU	JLTS					OVERAL	L
PROPERTY TESTS	JP	-8	JP-8	+100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L1	L	L1	L	L1	Localized Discoloration - All Samples	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	15.6057	15.6061	15.5955	15.5956	15.8229	15.8225				
GAIN / LOSS (gms)		.0004		.0001		0004		CN	W	W
MICROSCOPY EVAL.										,

FUELS	TI			ERIAL E IODS (28 I		RE	P		CONTRO s. post (str	_	YS @ 200°F	7)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	SERVATIO	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C2	C1	C1	C1	C1	С	C1	С	C1	C	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	31	29	230	160	667	392	47	64	304	194	569	440	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Cr	ND	NE	10	NE	10	NE	NE		NE		NE			NE	NE	NE
Ni	10	NE	10	NE	10	NE	NE		NE		NE			NE	NE	NE
Cu	20	NE	30	NE	40	NE	NE		NE		NE			NE	NE	NE
Fe	10	NE	ND	NE	ND	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = Control

UTC ENG: J. LEONE Greater than 500 ppb GT =LT = Less than 500 ppb**UDRI P.I. ENG:** D.H. KALT

No Spec. Req. and/or 4 (x) Additive Concentration A.F. AUT. W./MLSA:

NSR =L. PERKINS A.F. AUT. WL/POSF S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. I.M.21 MATERIAL / IDENTITY: 1010 CADMIUM PLATE (CLASS 2), FERROUS TEST TEMPERATURE (°F) 325 AIRFRAME, FUEL SYSTEM USE: **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** 13 DEC 95 JP-8 BASELINE FUEL:

		TEST N	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	5		
MATERIAL			RES	ULTS				,	OVERAL	Ĺ
PROPERTY TESTS	JP	-8	JP-8	8 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L1	L	L1	L	L1		CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P	Pitting - All Samples	CN	W	W
AVG. WT. (gms)	14.7372	14.7363	14.6692	14.6673	14.7155	14.7140				
GAIN / LOSS (gms)		0009		0019		0015		CN	W	W
MICROSCOPY EVAL.										1

FUELS	Т			ERIAL EX RIODS (28 D		E	P		CONTRO S. POST (STR	_	YS @ 325°	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JF	'-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C4	C2	C4	C2	С3	С	C2	С	C2	C	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	236	97	493	214	675	408	50	4	300	57	569	241	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY					1					
Fe	2	11	14	17	33	30	NE		NE		NE			NE	NE	NE
Cd	ND	ND	ND	ND	ND	ND	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME J. LEONE

N/A =Not applicable; CN = ControlUTC ENG:

GT =Greater than 500 ppb LT = Less than 500 ppb**UDRI P.I. ENG:** D.H. KALT NSR =No Spec. Req. and/or 4 (x) Additive Concentration A.F. AUT. W./MLSA: L. PERKINS

A.F. AUT. WL/POSF S. A. ANDERSON Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. I.M.22 MATERIAL / IDENTITY: 1010 ZINC PLATE, FERROUS TEST TEMPERATURE (°F) 325 AIRFRAME, TANK, AND PLUMBING USE: **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** 8 FEB 96 JP-8 BASELINE FUEL:

		TEST M	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	5		
MATERIAL			RES	ULTS				(OVERAL	L
PROPERTY TESTS	JP	-8	JP-8	8 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L1	L	L1	L	L1		CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P	Pitting - All Samples	CN	W	W
AVG. WT. (gms)	14.9737	14.9710	14.7334	14.7286	14.7765	14.7708				
GAIN / LOSS (gms)		0027		0048		0057		CN	W	W
MICROSCOPY EVAL.										

FUELS	Т			ERIAL EX IODS (28 D		E	P		CONTRO S. POST (STR	_	YS @ 325°	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JP	- -8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	SERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	С3	С3	C4	C4	С3	C2	С	C2	С	C2	C	C2		W	0	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	108	33	483	223	817	387	108	123	248	141	912	555	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Fe	35	ND	23	1	85	3	NE		NE		NE			NE	NE	NE
Zn	85	6	20	15	81	21	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L = Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W = Within Allowable Requirement;

OT = Material Tested Beyond Temperature Range O = Outside Allowable Requirement UDRI TECH:
N/A = Not applicable; CN = Control UTC ENG:

GT = Greater than 500 ppb

NSR = No Spec. Req. and/or 4 (x) Additive Concentration

CN = Control
LT = Less than 500 ppb
UDRI P.I. ENG:
A.F. AUT. W./MLSA:
L. PERKINS
A.F. AUT. WL/POSF
S. A. ANDERSON

DATE:

24 APR 98

A. BEHME

^{*} Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. I.M.23 MATERIAL / IDENTITY: 4130 CADMIUM PLATE (CLASS II), FERROUS, TYPE 2 GOAL TEST TEMPERATURE (°F) 200 AIRFRAME, FUEL SYSTEM USE: **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980 8 SEP 94 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST N	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULT	\mathbf{S}		
MATERIAL PROPERTY TESTS	JP	-8		ULTS 3 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES		OVERAL VALUATI	
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L	L	L	L	L	Localized Discoloration All Samples	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	10.4805	10.4832	10.3138	10.3139	10.3494	10.3492				
GAIN / LOSS (gms)		+.0027		+.0001		0002		CN	W	W
MICROSCOPY EVAL.										,

FUELS	Т			ERIAL EX LIODS (28 D		E	P		CONTRO S. POST (STR	-	YS @ 200°1	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JF	'-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C	C1	С	C1	С	C1	С	C1	С	C1	С	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	77	33	224	136	705	437	108	39	248	131	912	410	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Fe	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
Cd	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons:

DATE:

W =Within Allowable Requirement;

OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME N/A =Not applicable; CN = ControlUTC ENG: J. LEONE **UDRI P.I. ENG:** D.H. KALT

Greater than 500 ppb GT =LT = Less than 500 ppb

No Spec. Req. and/or 4 (x) Additive Concentration NSR =A.F. AUT. W./MLSA: L. PERKINS A.F. AUT. WL/POSF S. A. ANDERSON

24 APR 98

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. I.M.23 **MATERIAL / IDENTITY:** 4130 CADMIUM PLATE (CLASS II), FERROUS, TYPE 2 GOLD TEST TEMPERATURE (°F) 325 AIRFRAME, FUEL SYSTEM USE: **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** 26 SEP 96 JP-8 BASELINE FUEL:

		TEST N	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	3		
MATERIAL			RES	ULTS					OVERAL	L
PROPERTY TESTS							OBSERVATIONS AND REFERENCES	EV	VALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L3	L	L2	L	L2	SEVERE DISCOLORATION - JP-8	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND	LOCALIZED UNIFORM CORROSION - ALL SAMPLES	CN	W	W
AVG. WT. (gms)	15.8434	15.8436	15.8217	15.8180	15.7906	15.7839				
GAIN / LOSS (gms)		+.0002		0037		0067		CN	W	W
MICROSCOPY EVAL.										

FUELS	Т			ERIAL EX IODS (28 D		E	P		CONTRO S. POST (STR	_	YS @ 325°	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JF	'-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	SERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	С6	C5	C5	C4	C6	C4	С	C2	С	C2	С	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	200	77	558	72	984	205	108	123	248	141	912	555	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Fe	ND	10	90	170	360	1010	NE		NE		NE			NE	NE	NE
Cd	ND	ND	ND	ND	ND	10	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE Greater than 500 ppb GT =LT = Less than 500 ppb**UDRI P.I. ENG:** D.H. KALT

No Spec. Req. and/or 4 (x) Additive Concentration NSR =A.F. AUT. W./MLSA: L. PERKINS

A.F. AUT. WL/POSF S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. I.M.24 / II.M.1 **MATERIAL / IDENTITY:** 6 AL - 4 V, TITANIUM TEST TEMPERATURE (°F) 200 AIRFRAME, FUEL SYSTEM USE: 28 Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: 8 SEP 94 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST N	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	S		
MATERIAL			RES	ULTS					OVERAL	L
PROPERTY TESTS	JP	·-8	JP-8	8 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	EV	VALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L1	L	L1	L	L1	Localized Discoloration - All Samples	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	6.0379	6.0380	6.0280	6.0276	6.1284	6.1283				
GAIN / LOSS (gms)		+.0001		0004		0001		CN	W	W
MICROSCOPY EVAL.			•							

FUELS	Т	-		ERIAL EX IODS (28 DA		E	P		CONTRO S. POST (STE		YS @ 200°I	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7 28 7 28 7 28 C C1 C C1 C C1						PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	С	C1	C	C1	С	C1	С	C2	С	C2	С	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	72	40	223	173	684	433	108	37	248	131	912	410	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: C =Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: Within Allowable Requirement;

W =

OT =Material Tested Beyond Temperature Range

Not applicable; N/A =CN = Control

GT =Greater than 500 ppb LT = Less than 500 ppb NSR =No Spec. Req. and/or 4(x) Additive Concentration

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

O = Outside Allowable Requirement

DATE:

UDRI TECH:

UDRI P.I. ENG:

A.F. AUT. W./MLSA:

A.F. AUT. WL/POSF

UTC ENG:

24 APR 98

A. BEHME

J. LEONE

D.H. KALT

L. PERKINS

S. A. ANDERSON

TEST PLAN I.D. NO. I.M.25 MATERIAL / IDENTITY: 950 BRONZE ALUMINUM, CU TEST TEMPERATURE (°F) 200 AIRFRAME, FUEL SYSTEM USE: **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** 15 DEC 94 JP-8 BASELINE FUEL:

		TEST M	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	,		
MATERIAL			RES	ULTS				(OVERAL	L
PROPERTY TESTS	JP	-8	JP-3	8 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L1	L	L1	L	L1		CN	W	W
PITTING (VIS UAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	1.5671	1.5672	1.5073	1.5072	1.6203	1.6193				
GAIN / LOSS (gms)		+.0001		0001		0010		CN	W	W
MICROSCOPY EVAL.										

FUELS	Т			ERIAL EX IODS (28 D		E	P		CONTRO S. POST (STR	_	YS @ 200°	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JF	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	С3	C1	C2	C1	C2	С	C1	С	C1	С	C1		0	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	32	38	241	129	671	424	108	39	248	131	912	410	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Cu	NE	0	NE	50	NE	10	NE		NE		NE			NE	NE	NE
Al	NE	ND	NE	ND	NE	ND	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE GT =

Greater than 500 ppb LT = Less than 500 ppb**UDRI P.I. ENG:** D.H. KALT NSR =No Spec. Req. and/or 4 (x) Additive Concentration A.F. AUT. W./MLSA: L. PERKINS

A.F. AUT. WL/POSF

S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. I.M.25 MATERIAL / IDENTITY: 950 BRONZE ALUMINUM, CU TEST TEMPERATURE (°F) 325 AIRFRAME, FUEL SYSTEM USE: **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** 5 JAN 96 JP-8 BASELINE FUEL:

		TEST N	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	6		
MATERIAL PROPERTY TESTS	JP	-8		ULTS 8 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES		OVERALI VALUATI	
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST	OBSERVATIONS AND REPERENCES	JP8	+100	X4
COLOR	L	L1	L	L1	L	L1	Discoloration and Deposits - All Samples	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P	Minimum Pitting - All Samples	CN	W	W
AVG. WT. (gms)	17.1217	17.1170	16.8903	16.8854	17.0882	17.0841				
GAIN / LOSS (gms)		0047		0049		0041		CN	W	W
MICROSCOPY EVAL.										

FUELS	Т	-		ERIAL EX IODS (28 D		E	P		CONTRO S. POST (STR	_	YS @ 200°1	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JF	'-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C4	C5	C4	C6	C6	C5	С	C2	С	C2	С	C2		0	0	0
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	243	133	507	258	912	552	108	123	248	141	912	555	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME J. LEONE

N/A =Not applicable; CN = ControlUTC ENG: GT =Greater than 500 ppb LT = Less than 500 ppb**UDRI P.I. ENG:**

D.H. KALT NSR =No Spec. Req. and/or 4 (x) Additive Concentration A.F. AUT. W./MLSA: L. PERKINS A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. I.M.26A MATERIAL / IDENTITY: NAVAL BRASS (Cu / Ni - 70 / 30) TEST TEMPERATURE (°F) 200 AIRFRAME, FUEL SYSTEM USE: **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** 22 AUG 96 JP-8 BASELINE FUEL:

		TEST N	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	1		
MATERIAL PROPERTY TESTS	JP	-8		ULTS 8 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES		OVERALI ALUATI	
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST	OBSERVATIONS AND REFERENCES	JP8	+100	X4
COLOR	L	L2	L	L1	L	L1	Severe Discoloration and Deposits JP-8.	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND	Minimum Discoloration and Deposits - +100 & x4	CN	W	W
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P	Minimum Pitting - All Samples	CN	W	W
AVG. WT. (gms)	30.1833	30.1805	29.2547	29.2529	30.0340	30.0325				
GAIN / LOSS (gms)		0028		0018		0015		CN	W	W
MICROSCOPY EVAL.										

FUELS	Т			ERIAL EX IODS (28 D		E	P		CONTRO S. POST (STR	-	YS @ 200°	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JF	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C4	C5	C4	C6	C6	C5	C	C2	С	C2	C	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	198	112	486	334	868	552	108	39	248	131	912	410	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Cu	NE	30	NE	230	NE	110	NE		NE		NE			NE	NE	NE
Ni	NE	10	NE	150	NE	180	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement;

> OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** N/A =Not applicable; CN = ControlUTC ENG:

GT =Greater than 500 ppb LT = Less than 500 ppbNSR =No Spec. Req. and/or 4 (x) Additive Concentration

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

DATE:

UDRI P.I. ENG:

A.F. AUT. W./MLSA:

A.F. AUT. WL/POSF

_24 APR 98

_A. BEHME

J. LEONE

D.H. KALT

L. PERKINS

S. A. ANDERSON

Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. I.M.26B MATERIAL / IDENTITY: NAVAL BRASS (Cu / Ni - 90 / 10) TEST TEMPERATURE (°F) 200 AIRFRAME, FUEL SYSTEM USE: **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980 **TEST DATE START:** 22 AUG 96 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST M	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	5		
MATERIAL				ULTS	TD0 1	00 (77.4)			OVERAL	
PROPERTY TESTS	JP-8 JP-8 +100 JP8+100 (X4 PRE POST PRE POST PRE PC						OBSERVATIONS AND REFERENCES	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L2	L	L1	L	L1	Discoloration and Deposits - All Samples	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P	Minimum Pitting - All Samples	CN	W	W
AVG. WT. (gms)	18.5510	18.5478	18.6481	18.6458	18.5285	18.5267				
GAIN / LOSS (gms)		0032		0023		0018		CN	W	W
MICROSCOPY EVAL.									·	

FUELS	Т			ERIAL EX IODS (28 D		E	P		CONTRO S. POST (STR	-	YS @ 200°1	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JF	'-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7						PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	С3	C4	С3	С3	С3	C2	С	C1	С	C1	С	C1		0	0	0
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	213	103	495	326	865	604	108	39	248	131	912	410	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Cu	NE	400	NE	1160	NE	1880	NE		NE		NE			NE	NE	NE
Ni	NE	10	NE	90	NE	30	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L = Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: C = Clear C1 - C6 = Light to Dark

Greater than 500 ppb

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W = Within Allowable Requirement;

GT =

OT = Material Tested Beyond Temperature Range O = Outside Allowable Requirement
N/A = Not applicable; CN = Control

NSR = No Spec. Reg. and/or 4(x) Additive Concentration

 CN = Control
 UTC ENG:
 J. LEONE

 LT = Less than 500 ppb
 UDRI P.I. ENG:
 D.H. KALT

 A.F. AUT. W./MLSA:
 L. PERKINS

 A.F. AUT. WL/POSF
 S. A. ANDERSON

UDRI TECH:

24 APR 98

A. BEHME

DATE:

^{*} Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. I.M.27 MATERIAL / IDENTITY: 268 BRASS SHEET, SUBSTITUTE 260, Cu TEST TEMPERATURE (°F) 160 AIRFRAME, FUEL SYSTEM USE: **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** 11 OCT 96 JP-8 BASELINE FUEL:

		TEST M	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	5		
MATERIAL			RES	ULTS				(OVERAL	Ĺ
PROPERTY TESTS	JP-8 JP-8 +100 JP8+100 (X4) PRE POST PRE POST PRE POST						OBSERVATIONS AND REFERENCES	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L1	L	L	L	L	Discoloration - JP-8 Sample Only	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	16.9376	16.9372	17.1012	17.1000	17.0336	17.0324				
GAIN / LOSS (gms)		0004		0012		0012		CN	W	W
MICROSCOPY EVAL.										

FUELS	Т			ERIAL EX IODS (28 D		E	P		CONTRO S. POST (STR	_	YS @ 160°	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JP	'-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	7 28 7 28 7 28 C2 C2 C1 C1 C1 C1						POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C2	C1	C1	C1	C1	С	C1	С	C1	C	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	212	130	573	423	1094	752	NE	NE	NE	NE	NE	NE	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Cu	70	60	590	780	940	620	NE		NE		NE			NE	NE	NE
Zn	ND	70	170	320	410	270	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE GT =Greater than 500 ppb LT = Less than 500 ppb**UDRI P.I. ENG:** D.H. KALT

NSR =No Spec. Req. and/or 4 (x) Additive Concentration A.F. AUT. W./MLSA: L. PERKINS

A.F. AUT. WL/POSF S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. I.M.27 MATERIAL / IDENTITY: 268 BRASS SHEET, SUBSTITUTE 260, Cu
TEST TEMPERATURE (°F) 200 USE: AIRFRAME, FUEL SYSTEM

EXPOSURE TIME (DAYS) 28 TEST ADDITIVE/FUEL: Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

TEST DATE START: 15 OCT 96 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST N	MATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RE	SULTS			
MATERIAL			RES	ULTS					(OVERAL	L
PROPERTY TESTS	JF	P-8	JP-	8 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES		EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST			JP8	+100	X4
COLOR	L	L2	L	L2	L	L2	Discoloration - JP-8 Sample Only		CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND			CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND			CN	W	W
AVG. WT. (gms)	17.0971	17.0918	17.0691	17.0653	17.1710	17.1656					
GAIN / LOSS (gms)		0053		0038		0054			CN	W	W
MICROSCOPY EVAL.											
	Т	EST FUE	L / MAT	ERIAL E	XPOSUR	E	CONTROL FUEL S	SPEC.	TES	T RESU	LTS
FUELS		4 X 7	DAY PER	IODS (28 D	AYS)		PRE (NEW) VS. POST (STRESSED 7 DAYS @ 200°F)	ANGE		GENERA	
DDADEDTY TECTC*							ID 9 ID 9 . 100 ID 9 . 1004 FO	n m o	ODG	TED VA TEL	ONIC

FUELS	Т			ERIAL E		E	P		CONTRO S. POST (STR	_	YS @ 200°I	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JF	- -8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	С3	C2	С3	C2	C2	С	C1	C	C1	C	C1		0	0	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	199	96	497	364	888	820	108	39	248	131	912	410	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Cu	800	2670	920	3700	3520	3750	NE		NE		NE			NE	NE	NE
Zn	80	950	420	1640	2010	700	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L = Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W = Within Allowable Requirement; DATE:

N/A = Not applicable; CN = Control UTC ENG: J. LEONE
GT = Greater than 500 ppb LT = Less than 500 ppb UDRI P.I. ENG: D.H. KALT

NSR = No Spec. Req. and/or 4 (x) Additive Concentration

A.F. AUT. W./MLSA:

L. PERKINS

_24 APR 98

* Fuel Property Test Date Was Collected to Establish Whether Any Correlation Exists

* Evel Property Test Date Was Collected to Establish Whether Any Correlation Exists

TEST PLAN I.D. NO. I.M.27 MATERIAL / IDENTITY: 268 BRASS SHEET, SUBSTITUTE 260, Cu TEST TEMPERATURE (°F) 325 AIRFRAME, FUEL SYSTEM USE: **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

17 OCT 96 **TEST DATE START:** JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

	TEST M	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	8		
		RES	ULTS					OVERAL	L
JP-	JP-8 JP-8 +100 JP8+100 (X4) PRE POST PRE POST PRE POST L I.4 L I.3 L I.3					OBSERVATIONS AND REFERENCES	E	VALUATI	ON
PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
L	L4	L	L3	L	L3	Severe Discoloration and Deposits - All Samples	CN	W	W
ND	ND	ND	ND	ND	ND		CN	W	W
ND	ND	ND	ND	ND	ND		CN	W	W
17.1217	17.1170	16.8903	16.8854	17.0882	17.0841				
	0047		0049		0041		CN	W	W
	PRE L ND ND	JP-8 PRE POST L L4 ND ND ND ND 17.1217 17.1170	RESI JP-8 JP-9 JP-9	RESULTS JP-8 +100	JP-8 JP-8 +100 JP8+10 PRE POST PRE POST PRE L L4 L L3 L ND ND ND ND ND ND ND ND ND ND 17.1217 17.1170 16.8903 16.8854 17.0882	RESULTS JP-8 JP-8 +100 JP8+100 (X4) PRE POST PRE POST L L4 L L3 L L3 ND ND ND ND ND ND ND ND ND ND ND ND 17.1217 17.1170 16.8903 16.8854 17.0882 17.0841	RESULTS JP-8 100 JP8+100 (X4) OBSERVATIONS AND REFERENCES	RESULTS	RESULTS

		~	-	="		-	=								-	
FUELS	Т			ERIAL EX IODS (28 D		E	P		CONTRO S. POST (STR	_	YS @ 325°	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JF	'-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	SERVATI	ONS
	7	7 28 7 28 7 28 C4 C5 C4 C6 C6 C5						POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C4	C5	C4	C6	C6	C5	С	C2	С	C2	С	C2		0	0	0
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	243	133	507	258	912	552	108	123	248	141	912	555	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Cu	320	NE	1160	NE	490	NE	NE		NE		NE			NE	NE	NE
Zn	820	NE	2240	NE	2500	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG:

J. LEONE Greater than 500 ppb GT =LT = Less than 500 ppb**UDRI P.I. ENG:** D.H. KALT No Spec. Req. and/or 4 (x) Additive Concentration NSR =A.F. AUT. W./MLSA: L. PERKINS

S. A. ANDERSON

A.F. AUT. WL/POSF Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. I.M.28 MATERIAL / IDENTITY: LEAD AMS 4751 / 4750
TEST TEMPERATURE (°F) 200 USE: AIRFRAME ,TANK, AND PLUMBING

EXPOSURE TIME (DAYS) 28 TEST ADDITIVE/FUEL: Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

TEST DATE START: 5 DEC 96 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

	1	mean y	# A TOTO DE A T	/ DITEST DOOR	OCUPE					
		TEST N	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESU	LTS		
MATERIAL			RES	ULTS					OVERAL	L
PROPERTY TESTS	JP	·-8	JP-8	8 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	E	VALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST	JP8	+100	X4	
COLOR	L	L1	L	L1	L	L1	DEPOSITS ALL SAMPLES	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P	LOCALIZED PITTING ALL SAMPLES	CN	W	W
AVG. WT. (gms)	24.5921	24.5873	25.3667	25.3607	24.8926	24.8796				
GAIN / LOSS (gms)		0048		0060		0130		CN	W	W
MICROSCOPY EVAL.	VAL.									
	- T	-	<u> </u>	-	· · ·	·			· ·	

FUELS	T	-		ERIAL E		E	P		CONTRO S. POST (STR	_	YS @ 200°	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JP	- -8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7							POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C2	C2	C1	C2	C1	С	C1	С	C1	С	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	299	88	439	294	686	768	108	39	248	131	912	410	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L = Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W = Within Allowable Requirement;

OT = Material Tested Beyond Temperature Range O = Outside Allowable Requirement UDRI TECH: <u>A. BEHME</u>

N/A = Not applicable; CN = Control UTC ENG: J. LEONE
GT = Greater than 500 ppb LT = Less than 500 ppb UDRI P.I. ENG: D.H. KALT

DATE:

_24 APR 98

NSR = No Spec. Req. and/or 4 (x) Additive Concentration

L1 = Less than 500 ppb

UDKI P.I. ENG:

D.H. KAL1

A.F. AUT. W./MLSA:

L. PERKINS

A.F. AUT. WL/POSF
S. A. ANDERSON

I.M.28 **MATERIAL / IDENTITY:** LEAD, AMS 4751 / 4750 TEST PLAN I.D. NO.

TEST TEMPERATURE (°F) 325 AIRFRAME, TANK, AND PLUMBING **USE:**

EXPOSURE TIME (DAYS) 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

4 OCT 95 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST N	MATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	S		
MATERIAL			RES	ULTS					OVERAL	L
PROPERTY TESTS	JF	'-8	JP-8	3 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	E	VALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L1	L	L1	L	L1		CN	W	W
PITTING (VISUAL)	ND	P	ND	P	ND	P		CN	W	W
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P	Pitting - All Samples	CN	W	W
AVG. WT. (gms)	24.4441	24.4370	23.9283	23.9120	24.6278	24.6055				
GAIN / LOSS (gms)		0071		0163		0223		CN	W	W
MICROSCOPY EVAL.										
	Т	EST FIIE	T / MAT	ERIAL E	XPOSUR	F	CONTROL FUEL SPEC.	TES	ST RESU	LTS

FUELS	Т	-		ERIAL EXIODS (28 D		E	P		CONTRO S. POST (STR	_	YS @ 325°	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JP	P-8	JP-8	+ 100	JP-8 +	- 100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2		C2		C2		С	C2	C	C2	C	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	97	5	358	62	597	641	108	123	248	141	912	555	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Pb	600	1200	50,000	7000	22,000	26,200	NE		NE		NE			NE	NE	NE
Sn	5	6	5	5	6	5	NE		NE		NE			NE	NE	NE
Cu	7	9	25	33	34	60	NE		NE		NE			NE	NE	NE
Be	ND	ND	ND	ND	ND	ND	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =

Comparisons: W =

DATE: 24 APR 98 Within Allowable Requirement; OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT

NSR =No Spec. Req. and/or 4 (x) Additive Concentration L. PERKINS A.F. AUT. W./MLSA: A.F. AUT. WL/POSF S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. I.M.29 MATERIAL / IDENTITY: **BARIUM FERRITE, Ba** TEST TEMPERATURE (°F) 160 AIRFRAME, TANK / EXT. (QT. LEVEL) USE: **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980 11 OCT 96 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST N	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	5		
MATERIAL			RES	ULTS				(OVERAL	L
PROPERTY TESTS	JP	-8	JP-8	3 +100	JP8+10	00 (X4)	OBSERVATIONS AND REFERENCES	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L	L	L	L	L		CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND	Control46 KG	CN	W	W
AVG. WT. (gms)	2.2464	2.2485	2.2610	2.2598	2.2722	2.2657	JP-845 KG			
GAIN / LOSS (gms)		+.0021		0012		0065	+10045 KG	CN	W	W
MICROSCOPY EVAL.				•			X447 KG			•

		-	-	="		-	-						·			
FUELS	Т			ERIAL EX IODS (28 D		E	P		CONTRO S. POST (STR	_	YS @ 160°	F)	SPEC. RANGE		ST RESU GENERA	
PROPERTY TESTS*							JF	P-8	JP-8	+ 100	JP-8 +	- 100 x4	FOR JP-8	OBS	SERVATIO	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C1	C1	C1	C1	C1	C1	С	C1	С	C1	C	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	231	186	564	489	1078	789	NE	NE	NE	NE	NE	NE	150/600	W	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Fe	10	NE	10	NE	60	NE	NE		NE		NE			NE	NE	NE
Ba	30	NE	ND	NE	ND	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement;

> OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:**

N/A =Not applicable; CN = ControlUTC ENG: GT =Greater than 500 ppb LT = Less than 500 ppb**UDRI P.I. ENG:**

D.H. KALT No Spec. Req. and/or 4 (x) Additive Concentration NSR =A.F. AUT. W./MLSA: L. PERKINS S. A. ANDERSON

DATE:

24 APR 98

A. BEHME

J. LEONE

A.F. AUT. WL/POSF Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. I.M.29 MATERIAL / IDENTITY: **BARIUM FERRITE, Ba** TEST TEMPERATURE (°F) 200 AIRFRAME, TANK / EXT. (QT. LEVEL) USE: **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980 JP-8 BASELINE FUEL: **TEST DATE START:** 22 AUG 96 93 POSF 2980 + (JP-8 Additives)

		TEST N	MATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	}		
MATERIAL			RESU	ULTS				1	OVERAL	L
PROPERTY TESTS	JP-8 JP-8 +100 JP8+100 (X4) PRE POST PRE POST PRE POS					00 (X4)	OBSERVATIONS AND REFERENCES	EA	VALUATI	ON_
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	NE	L	NE	L	NE	Material Deterioration Significant	OT	OT	OT
PITTING (VISUAL)	ND	NE	ND	NE	ND	NE		OT	OT	OT
PITTING (MICROSCOPY)	ND	NE	ND	NE	ND	NE	Control46KG	OT	OT	OT
AVG. WT. (gms)	2.2474	2.2095	2.2486	2.2203	2.2415	2.2227	JP-832 KG			
		0379		0283		0188	+10035KG	OT	OT	OT
MICROSCOPY EVAL.							X432KG			

FUELS	Т			ERIAL EXIODS (28 D		E	P		CONTRO S. POST (STR	-	YS @ 200°1	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JF	'-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C2	C2	C2	C2	C2	С	C1	С	C1	С	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	226	105	494	337	862	531	108	123	248	141	912	555	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Fe	NE	80	NE	ND	NE	120	NE		NE		NE			NE	NE	NE
Ba	NE	10	NE	ND	NE	ND	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME N/A =Not applicable; CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb**UDRI P.I. ENG:** D.H. KALT NSR =No Spec. Req. and/or 4 (x) Additive Concentration A.F. AUT. W./MLSA: L. PERKINS

S. A. ANDERSON

A.F. AUT. WL/POSF

TEST PLAN I.D. NO. I.M.29 MATERIAL / IDENTITY: **BARIUM FERRITE** TEST TEMPERATURE (°F) 325 AIRFRAME, TANK / EXT. (QT. LEVEL) USE: **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980 **TEST DATE START:** 2 JUL 96 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST N	MATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST	RESULTS			
MATERIAL			RES	ULTS						OVERAL	ւ
PROPERTY TESTS	JI	P-8	JP-	8 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCE	\mathbf{S}	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	POST PRE POST PRE POST								X4
COLOR	L	NE	L	NE	L	NE	Material Deteteriation Significant		OT	OT	OT
PITTING (VISUAL)	ND	NE	ND	NE	ND	NE	Control: .46 KG		OT	OT	OT
PITTING (MICROSCOPY)	ND	NE	ND	NE	ND	NE	JP-8: .15 KG		OT	OT	OT
AVG. WT. (gms)	NE	NE	NE	NE	NE	NE	+100: .20 KG				1
GAIN / LOSS (gms)		NE		NE		NE	x4: .22 KG		OT	OT	OT
MICROSCOPY EVAL.											
		-						anna			
	T	EST FUE	L / MAT	ERIAL E	XPOSUR	E	CONTROL FUEL	SPEC.	TES	ST RESU	LTS

FUELS	Т			ERIAL E		E	P		CONTRO S. POST (STR		YS @ 325°I	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JF	- -8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	NE	NE	NE	C	C2	C	C2	С	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	NE	NE	NE	NE	NE	NE	108	123	248	141	912	555	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Ba	10	16	ND	33	640	100	NE		NE		NE			NE	NE	NE
Fe	65	200	12	650	2000	1300	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement;

DATE: _24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** _A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppbUDRI P.I. ENG: D.H. KALT NSR =No Spec. Req. and/or 4 (x) Additive Concentration A.F. AUT. W./MLSA: L. PERKINS

A.F. AUT. WL/POSF S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

I.M.30 **MATERIAL / IDENTITY: NEO-DYMIUM,** TEST PLAN I.D. NO.

TEST TEMPERATURE (°F) 200 AIRFRAME FUEL TANK / EXT. (LEVEL CONTROL) **USE: EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

22 AUG 96 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST N	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	5		
MATERIAL PROPERTY TESTS	.IP	-8		ULTS 8 +100	IP8±1	00 (X4)	ODSEDVATIONS AND DEFEDENCES		OVERALI /ALUATI	
	-						OBSERVATIONS AND REFERENCES	<u> </u>		
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L2	L	L2	L	L2	Deposits/Discoloration All Samples	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND	Control85 KG	CN	W	W
AVG. WT. (gms)	2.0941	2.0918	2.1128	2.1042	1.8184	1.8117	JP-872 KG			
GAIN / LOSS (gms)		0023		0086		0067	+10078 KG	CN	W	W
MICROSCOPY EVAL.							X475 KG			

FUELS	Т			ERIAL EXIODS (28 D		E	P		CONTRO S. POST (STE	_	YS @ 200°	F)	SPEC. RANGE		ST RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	- 100 x4	FOR JP-8	OBS	SERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C2	C2	C2	C2	C2	C	C1	C	C1	С	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	215	101	490	345	928	657	108	39	248	131	912	410	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Fe	NE	70	NE	10	NE	20	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =Not Evaluated;

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT

NSR =No Spec. Req. and/or 4 (x) Additive Concentration L. PERKINS A.F. AUT. W./MLSA: A.F. AUT. WL/POSF S. A. ANDERSON

I.M.30 **MATERIAL / IDENTITY: NEO-DYMIUM,** TEST PLAN I.D. NO. TEST TEMPERATURE (°F) 325 AIRFRAME FUEL TANK / EXT. (LEVEL CONTROL) **USE:**

EXPOSURE TIME (DAYS) 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

2 JUL 96 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST M	1ATERIA L	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	5		
MATERIAL			RES	ULTS					OVERAL	L
PROPERTY TESTS	JI	·-8	JP-	8 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L2	L	L2	L	L2	Deposits/Discoloration All Samples	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND	Control85 KG	CN	W	W
AVG. WT. (gms)	NE	NE	NE	NE	NE	NE	JP-832			
GAIN / LOSS (gms)		NE		NE		NE	+10032	CN	W	W
MICROSCOPY EVAL.							X435			

51151.0	Т			ERIAL E		E	n		CONTRO	-	VC @ 2250	E)	SPEC.		T RESU	
FUELS PROPERTY TESTS*		4 X 7	DAY PER	RIODS (28 D	AYS)			7-8	S. POST (STR JP-8			100 x4	RANGE FOR JP-8		GENERA SERVATI	
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	NE	NE	NE	С	C2	C	C2	С	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	NE	NE	NE	NE	NE	NE	108	123	248	141	912	555	150/600	0	W	w
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Fe	NE	ND	410	140	840	345	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =

Comparisons: W =

DATE: 24 APR 98 Within Allowable Requirement; OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT NSR =No Spec. Req. and/or 4 (x) Additive Concentration L. PERKINS A.F. AUT. W./MLSA:

A.F. AUT. WL/POSF S. A. ANDERSON

I.M.31 **MATERIAL / IDENTITY:** B36 - 91A, BRASS SHEET, Cu TEST PLAN I.D. NO. TEST TEMPERATURE (°F) 200 AIRFRAME, TANK PUMP SCREEN **USE:**

EXPOSURE TIME (DAYS) 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

1 DEC 94 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST N	MATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS								
MATERIAL RESULTS								OVERALL							
PROPERTY TESTS	JP	JP-8 JP-8 +100 JP8+100 (X4)			JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	EVALUATION							
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4					
COLOR	L	L1	L	L1	L	L1	Localized Discoloration	CN	W	W					
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W					
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W					
AVG. WT. (gms)	17.5591	17.5587	17.5658	17.5653	17.5371	17.5353									
GAIN / LOSS (gms)		0004		0005		0018		CN	W	W					
MICROSCOPY EVAL.															

FUELS	Т			ERIAL E		Œ	P		CONTRO S. POST (STR		YS @ 200°	F)	SPEC. RANGE	TEST RESULTS GENERAL		
PROPERTY TESTS*							JP	JP-8 JP-8 +			+ 100 JP-8 + 100 x4			OBSERVATIO		ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	С3	С3	C1	C4	C2	С	C1	C	C1	C	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	29	48	231	185	675	631	108	39	248	131	912	410	150/600	0	W	0
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Cu	800	15	1350	90	2900	300	NE		NE		NE			NE	NE	NE
Pb	30	ND	40	ND	40	ND	NE		NE		NE			NE	NE	NE
Sn	100	ND	100	ND	100	ND	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT = Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT

NSR =No Spec. Req. and/or 4 (x) Additive Concentration L. PERKINS A.F. AUT. W./MLSA: A.F. AUT. WL/POSF S. A. ANDERSON

I.M.31 **MATERIAL / IDENTITY:** B36 - 91A, BRASS SHEET, Cu TEST PLAN I.D. NO. TEST TEMPERATURE (°F) 325 AIRFRAME, TANK PUMP SCREEN **USE: EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

3 MAR 95 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST N	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS								
MATERIAL PROPERTY TESTS	RESULTS JP-8 JP-8 +100 JP8+100 (X4)					00 (X4)	OBSERVATIONS AND REFERENCES		OVERALI 'ALUATI						
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST	OBSERVATIONS AND REFERENCES	JP8	+100	X4					
COLOR	L	L3	L	L3	L	L3	Localized Discoloration All Samples	CN	W	W					
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W					
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P	Minimum Pitting All Samples - Depth Not Measurable	CN	W	W					
AVG. WT. (gms)	17.5518	17.5524	17.5304	17.5294	17.5245	17.5230									
GAIN / LOSS (gms)		+.0006		0010		0015		CN	W	W					
MICROSCOPY EVAL.															

FUELS	TEST FUEL / MATERIAL EXPOSURE 4 X 7 DAY PERIODS (28 DAYS)								CONTRO S. POST (STR	_	YS @ 325°	F)	SPEC. RANGE	TEST RESULTS GENERAL		
PROPERTY TESTS*	ľ						JP-8 JP-8 + 100			JP-8 + 100 x4		FOR JP-8	OBS	ERVATI	ONS	
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C2	C2	C2	C2	C2	С	C2	C	C2	C	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	136	5	264	94	567	385	108	123	248	141	912	555	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Cu	180	320	590	370	860	<10	NE		NE		NE			NE	NE	NE
Pb	100	10	130	10	100	ND	NE		NE		NE			NE	NE	NE
Sn	100	NE	160	NE	180	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT = Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT

NSR =No Spec. Req. and/or 4 (x) Additive Concentration L. PERKINS A.F. AUT. W./MLSA: A.F. AUT. WL/POSF S. A. ANDERSON

Fuel Property Test Data Was Collected to Es tablish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. I.M.32 MATERIAL / IDENTITY: 1010 (BARE), Fe TEST TEMPERATURE (°F) 200 AIRFRAME, FUEL SYSTEM USE: **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

TEST DATE START: 1 DEC 94 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST M	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS								
MATERIAL RESULTS								(OVERAL	Ĺ					
PROPERTY TESTS	JP	JP-8 JP-8 +100 JP8+100 (X4)				00 (X4)	OBSERVATIONS AND REFERENCES	EVALUATION							
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4					
COLOR	L	L3	L	L2	L	L1	Uniform Corrosion Over 50% of Surface Area, One Side Only - All Samples	CN	W	W					
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W					
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P	Minimum Pitting - All Samples	CN	W	W					
AVG. WT. (gms)	14.4516	14.4515	14.5668	14.5662	14.6412	14.6409				l					
GAIN / LOSS (gms)		0001		0006		0003		CN	W	W					
MICROSCOPY EVAL.										I					

FUELS	Т			ERIAL EX IODS (28 D		E	P		CONTRO S. POST (STR	_	YS @ 200°1	F)	SPEC. RANGE	TEST RESULTS GENERAL		
PROPERTY TESTS*								JP-8 JP-8 + 1			JP-8 +	100 x4	FOR JP-8	-8 OBSERVA		ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C1	C2	C1	C1	C1	C1	С	C1	С	C1	С	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	33	29	232	167	673	403	108	39	248	131	912	410	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb**UDRI P.I. ENG:** D.H. KALT NSR =No Spec. Req. and/or 4 (x) Additive Concentration A.F. AUT. W./MLSA: L. PERKINS

A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. I.M.32 MATERIAL / IDENTITY: 1010 (BARE), Fe
TEST TEMPERATURE (°F) 325 USE: AIRFRAME, FUEL SYSTEM

EXPOSURE TIME (DAYS) 28 TEST ADDITIVE/FUEL: Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

TEST DATE START: 26 SEP 96 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST N	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS							
MATERIAL			RES	ULTS				(OVERAL	L				
PROPERTY TESTS	JP	-8	JP-8	8 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	EVALUATION						
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4				
COLOR	L	L3	L	L3	L	L3	Uniform Corrosion All Samples	CN	W	W				
PITTING (VISUAL)	ND	P	ND	P	ND	P	Surface Corrosion on All Samples - Removed With 120 Grit Sandpaper	CN	W	W				
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P	Pitting All Samples	CN	W	W				
AVG. WT. (gms)	16.8207	16.7769	16.8280	16.8234	16.7777	16.8155								
GAIN / LOSS (gms)		0438		0046		+.0378		CN	W	W				
MICROSCOPY EVAL.														

FUELS	Т	-		ERIAL EX IODS (28 D		E	P		CONTRO S. POST (STR		YS @ 325°	F)	SPEC. RANGE	TEST RESULTS GENERAL		
PROPERTY TESTS*								JP-8 JP-8 + 100			JP-8 + 100 x4		FOR JP-8	OBS	BSERVATIONS	
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C6	C5	С6	С3	C6	C4	С	C2	С	C2	С	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	207	85	558	98	986	216	108	123	248	141	912	555	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Fe	ND	40	120	780	370	1680	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

LEONE

Comparisons:

W =

Metallic Color: L = Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: C = Clear C1 - C6 = Light to Dark

Within Allowable Requirement;

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

OT = Material Tested Beyond Temperature Range O = Outside Allowable Requirement UDRI TECH: __A.

BEHME

GT = Greater than 500 ppb LT = Less than 500 ppb UDRI P.I. ENG: <u>D.H. KALT</u>

NSR = No Spec. Req. and/or 4 (x) Additive Concentration

A.F. AUT. W./MLSA: L. PERKINS

A.F. AUT. WL/POSF S. A. ANDERSON

DATE:

24 APR 98

^{*} Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists
Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. I.M.33 MATERIAL / IDENTITY: B - 29 (ASTM), SOFT LEAD, Pb TEST TEMPERATURE (°F) 200 AIRFRAME, FUEL SYSTEM USE: **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /92 POSF 2926 92 POSF 2926 + (JP-8 Additives) **TEST DATE START:** 13 FEB 97 JP-8 BASELINE FUEL:

		TEST A	(ATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TECH DECILITION	<u> </u>		
		11.011		, I CLL LIN	OBCILL		EVALUATION OF TEST RESULTS)		
MATERIAL			RES	ULTS				(OVERAL	L
PROPERTY TESTS	JP	JP-8 JP-8 +100 JP8+100 (X4) PRE POST PRE POST I I I I					OBSERVATIONS AND REFERENCES	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L1	L	L1	L	L1	Minimum Surface Deposits All Samples	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	6.8966	6.8958	6.9306	6.9294	7.1736	7.1706				
GAIN / LOSS (gms)		0009		0012	_	0030		CN	W	W
MICROSCOPY EVAL.										1

FUELS	Т			ERIAL EX IODS (28 D		E	P		CONTRO S. POST (STR	_	YS @ 200°	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JP	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C1	C1	C1	C1	C1	C1	С	C2	С	C2	C	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	28	25	221	170	606	449	108	39	248	131	912	410	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Pb	850	NE	1280	NE	2470	NE	NE		NE		NE			NE	NE	NE
Cu	10	NE	10	NE	10	NE	NE		NE		NE			NE	NE	NE
Sn	ND	NE	ND	NE	ND	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME N/A =Not applicable; CN = ControlUTC ENG: J. LEONE

GT =

Greater than 500 ppb LT = Less than 500 ppb**UDRI P.I. ENG:** D.H. KALT NSR =No Spec. Req. and/or 4 (x) Additive Concentration A.F. AUT. W./MLSA: L. PERKINS A.F. AUT. WL/POSF S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. IM34/IIM27 **MATERIAL / IDENTITY: MONEL 400** TEST TEMPERATURE (°F) 325 AIRFRAME, TANK, & PLUMBING USE: **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980 **TEST DATE START:** 6 DEC 95 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST N	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	3		
MATERIAL			RES	ULTS				(OVERAL	L
PROPERTY TESTS	JP	-8	JP-8	3 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L1	L	L1	L	L1	Surface Deposits All Samples	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	15.8205	15.8175	15.7782	15.7762	15.6879	15.6849				
GAIN / LOSS (gms)		0030		0020		0030		CN	W	W
MICROSCOPY EVAL.										

FUELS	Т	-		ERIAL E		E	P		CONTRO S. POST (STR		YS @ 325°l	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JP	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C4	C5	C4	C5	C4	C5	С	C2	C	C2	C	C2		NE	NE	NE
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	235	162	500	210	757	482	50	4	300	57	569	241	150/600	W	W	NE
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	160	360	270	610	830	840	NE		NE		NE			NE	NE	NE
	790	1310	850	1070	1060	1900	NE		NE		NE			NE	NE	NE
							NE		NE		NE			NE	NE	NE
							NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L = Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W = Within Allowable Requirement;

OT = Material Tested Beyond Temperature Range O = Outside Allowable Requir N/A = Not applicable; CN = Control

GT = Greater than 500 ppb LT = Less than

NSR = No Spec. Req. and/or 4(x) Additive Concentration

DATE: 24 MAR 98

O = Outside Allowable Requirement

CN = Control

LT = Less than 500 ppb

UDRI P.I. ENG:
A.F. AUT. W./MLSA:
A.F. AUT. WL/POSF

S.A. ANDERSON

^{*} Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. I.M.35 MATERIAL / IDENTITY: 15-5 pH, STAINLESS STEEL TEST TEMPERATURE (°F) 325 AIRFRAME, FUEL SYSTEM USE: **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980 **TEST DATE START:** 26 SEP 96 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST N	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	3		
MATERIAL			RES	ULTS				(OVERAL	L
PROPERTY TESTS	JP	-8	JP-8	3 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L2	L	L1	L	L1	Severe Discoloration-JP-8	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND	45 Minute Power Outage During Test Cycle	CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND	Uniform Corrosion In Crevices From Rough Surface Finish - All Samples	CN	W	W
AVG. WT. (gms)	16.6912	16.6924	16.5808	16.5806	16.4901	16.4899				
GAIN / LOSS (gms)		+.0012		0002		0002		CN	W	W
MICROSCOPY EVAL.							_			

FUELS	Т			ERIAL EX IODS (28 D		E	P		CONTRO S. POST (STR	_	YS @ 325°	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JF	'-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	С6	C6	С6	C6	C6	C6	С	C2	С	C2	С	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	198	69	558	81	975	111	108	123	248	141	912	555	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Cr	10	20	80	210	290	150	NE		NE		NE			NE	NE	NE
Ni	ND	30	ND	20	ND	10	NE		NE		NE			NE	NE	NE
Cu	ND	30	ND	70	ND	30	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement;

DATE: OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:**

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE GT =Greater than 500 ppb LT = Less than 500 ppb**UDRI P.I. ENG:** D.H. KALT

24 APR 98

A. BEHME

NSR =No Spec. Req. and/or 4 (x) Additive Concentration A.F. AUT. W./MLSA: L. PERKINS

A.F. AUT. WL/POSF S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. I.M.36 MATERIAL / IDENTITY: **5052 -H34 ALUMINUM** TEST TEMPERATURE (°F) 200 AIRFRAME, FUEL SYSTEM USE: **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** 15 OCT 96 JP-8 BASELINE FUEL:

		TEST M	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	5		
MATERIAL			RES	ULTS				(OVERALI	L
PROPERTY TESTS	JP	-8	JP-	8 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L1	L	L1	L	L1	Discoloration - All Samples	CN	W	W
PITTING (VISUAL)	ND	P	ND	P	ND	P		CN	W	W
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P	Localized Pitting - All Samples	CN	W	W
AVG. WT. (gms)	5.2936	5.2932	5.3672	5.3668	5.3308	5.3303				
GAIN / LOSS (gms)		0004		0004		0005		CN	W	W
MICROSCOPY EVAL.										

FUELS	Т	-		ERIAL EX LIODS (28 D		E	P		CONTRO S. POST (STR	_	YS @ 200°1	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JF	·-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C2	C1	C1	C1	C1	С	C1	С	C1	C	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	182	112	519	295	890	467	108	39	248	131	912	410	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement;

DATE: OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:**

A. BEHME N/A =Not applicable; CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppbUDRI P.I. ENG: D.H. KALT No Spec. Req. and/or 4 (x) Additive Concentration

NSR =A.F. AUT. W./MLSA: L. PERKINS A.F. AUT. WL/POSF S. A. ANDERSON

24 APR 98

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. I.M.37/IM23 **MATERIAL / IDENTITY:** 4130 CADMIUM PLATE, CLASS II, TYPE 2 GOLD, FE TEST TEMPERATURE (°F) 325 USE: AIRFRAME, FUEL SYSTEM Betz Dearborn 8Q462 ((Normal and x4 Concentrations) /92 POSF 2926 28 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL: TEST DATE START:** 2 DEC 97 92 POSF 2926+ (JP-8 Additives) JP-8 BASELINE FUEL:

		TEST M	ATERIAL /	FUEL EXP	POSURE		EVALUATION OF TEST RESULTS	5		
MATERIAL			RESU	JLTS				•	OVERALI	ւ
PROPERTY TESTS	JP	2-8	JP-8	+100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L2	L	L2	L	L2	Localized Discoloration All Samples	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	18.4768	18.4777	19.0468	19.0446	18.8277	18.8269				
GAIN / LOSS (gms)		+.0009		0022		0008		CN	W	W
MICROSCOPY EVAL.										

FUELS	T	-		ERIAL E IODS (28 D		RE	F	PRE (NEW) V	CONTRO S. POST (STR	_	YS @ 325°I	· ()	SPEC. RANGE		ST RESU GENERA	
PROPERTY TESTS*							J]	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	SERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	С6	C5	C4	C6	C5	C6	С	C2	С	C2	C	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	252	138	409	108	703	148	108	123	248	141	912	555	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY		L								
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated: $ND = Not \ Detected; \quad BD = Below \ Detection$ P = Pitting

Comparisons: W =Within Allowable Requirement;

OT = Material Tested Beyond Temperature Range N/A =Not applicable;

Greater than 500 ppb GT =

NSR = No Spec. Req. and/or 4 (x) Additive Concentration O = Outside Allowable Requirement

CN = Control

LT = Less than 500 ppb

DATE: UDRI TECH: UTC ENG: **UDRI P.I. ENG:**

A.F. AUT. W./MLSA: A.F. AUT. WL/POSF

24 APR 98 __A. BEHME J. LEONE D.H. KALT L. PERKINS S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists **Between Material Degradation and Fuel Properties Degradation**

TEST PLAN I.D. NO. I.M.38 **MATERIAL / IDENTITY:** 1045 BARE, FERROUS TEST TEMPERATURE (°F) 325 **USE:** AIRFRAME, FUEL SYSTEM 28 Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL:** 5 DEC 96 93 POSF 2926 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST N	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	5		
MATERIAL PROPERTY TESTS	ID	-8		ULTS 8 ±100	IP8±1	00 (Y 4)	ORCEDUATIONS AND REFERENCES		OVERAL! /ALUATI	
	JP-8 JP-8+100 JP8+100 (X4) OBSERVATIONS AND REFERENC PRE POST PRE POST								_	
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L3	L	L2	L	L2	Uniform Corrosion All Samples	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	17.7013	17.6974	17.8509	17.8474	17.6757	17.6721				1
GAIN / LOSS (gms)		0039		0035		0036		CN	W	W
MICROSCOPY EVAL.							Rough Surface Finish All Samples			1

FUELS	Т	-		ERIAL EX IODS (28 D		E	P		CONTRO S. POST (STR	_	YS @ 325°	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C2	C2	C2	C2	C2	С	C2	C	C2	С	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	236	6	574	30	895	541	108	123	248	141	912	555	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Fe	80	150	NE	580	NE	830	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits $\mathbf{L} =$

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; $ND = Not \ Detected; \quad BD = Below \ Detection$ P = Pitting

Comparisons:

W =Within Allowable Requirement;

OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement UDRI TECH: __A. BEHME N/A =Not applicable; CN = ControlUTC ENG: J. LEONE Greater than 500 ppb GT =LT = Less than 500 ppb**UDRI P.I. ENG:** D.H. KALT A.F. AUT. W./MLSA: L. PERKINS

DATE:

A.F. AUT. WL/POSF

24 APR 98

S. A. ANDERSON

NSR = No Spec. Req. and/or 4 (x) Additive Concentration

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists **Between Material Degradation and Fuel Properties Degradation**

TEST PLAN I.D. NO. I.M.39 **MATERIAL / IDENTITY:** AZ91 T-6 (SUBSTITUTE AZ31 - H24), MAGNESIUM TEST TEMPERATURE (°F) 200 **USE:** AIRFRAME, FUEL SYSTEM 28 Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL:** 5 DEC 96 93 POSF 2926 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST N	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULT	$\overline{\mathbf{S}}$		
MATERIAL			RES	ULTS					OVERAL	L
PROPERTY TESTS	JP-8 JP-8 +100 JP8+100 (X4) PRE POST PRE POST PRE POST						OBSERVATIONS AND REFERENCES	EA	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L1	L	L1	L	L1	Localized Uniform Corrosion	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P	Minimum Pitting All Samples	CN	W	W
AVG. WT. (gms)	3.8919	3.8920	3.8841	3.8858	3.8900	3.8950				
GAIN / LOSS (gms)		+.0001		+.0017		+.0050		CN	W	W
MICROSCOPY EVAL.										

FUELS	Т	-		ERIAL EX IODS (28 D		E	P		CONTRO S. POST (STR	_	YS @ 200°I	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C1	C1	C1	C1	C1	C1	С	C1	C	C1	C	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	222	111	598	311	891	875	108	39	248	131	912	410	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Al	NE	60	NE	40	NE	30	NE		NE		NE			NE	NE	NE
Mg	NE	90	NE	80	NE	70	NE		NE		NE			NE	NE	NE
Zn	NE	ND	NE	10	NE	ND	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L = Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W = Within Allowable Requirement;

OT = Material Tested Beyond Temperature Range

N/A = Not applicable; GT = Greater than 500 ppb

NSR = No Spec. Req. and/or 4(x) Additive Concentration

 $O = Outside \ Allowable \ Requirement$

CN = Control LT = Less than 500 ppb DATE: UDRI TECH: UTC ENG: UDRI P.I. ENG:

A.F. AUT. W./MLSA:

A.F. AUT. WL/POSF

24 APR 98
A. BEHME
J. LEONE
D.H. KALT
L. PERKINS
S. A. ANDERSON

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

I.M.40 **MATERIAL / IDENTITY:** 4130 BARE, STEEL, Fe TEST PLAN I.D. NO. TEST TEMPERATURE (°F) 325 AIRFRAME, FUEL SYSTEM **USE: EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /92 POSF 2926

13 FEB 97 92 POSF 2926 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST N	IATERIAL	/ FUEL EX	POSURE		EVALUATION OF TEST RESULTS	S		
MATERIAL			RES	ULTS					OVERAL	.L
PROPERTY TESTS	JP-8 JP-8 +100 JP8+100 (X4) PRE POST PRE POST PRE PO						OBSERVATIONS AND REFERENCES	EV	VALUATI	ON
(AVG. 5 SPECIMENS)	ENS) PRE POST PRE POST PRE PC L L3 L L2 L L							JP8	+100	X4
COLOR	L	L3	L	L2	L	L2	UNIFORM CORROSION ALL SAMPLES	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	18.6185	18.6166	18.5955	18.5854	18.6291	18.6134	*AFTER 7 DAYS SIGNIFICANT AMOUNT OF DEBRIS WAS NOTED (AS SOLID)			
GAIN / LOSS (gms)		0079		0101		0157	IN FUEL	CN	W	W
MICROSCOPY EVAL.										

FUELS	Т	-		ERIAL EX IODS (28 D		E	P.		CONTRO S. POST (STE	_	YS @ 200°	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	- 100 x4	FOR JP-8	OBS	SERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	С3	С3	С3	С3	C4	C4	С	C2	С	C2	С	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	239	55	404	87	657	467	108	123	248	141	912	555	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =

Comparisons: W =

DATE: 24 APR 98 Within Allowable Requirement; OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT

NSR =No Spec. Req. and/or 4 (x) Additive Concentration L. PERKINS A.F. AUT. W./MLSA:

A.F. AUT. WL/POSF S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

FUEL / MATERIAL COMPATIBILITY TEST RESULTS TEST PLAN I.D. NO. I.M.41 See I.J.16 MATERIAL / IDENTITY: SOLDER Sn 95-Sb 05 WIRE .020" ENGINE FUEL CONTROL STEPPER MOTOR TEST TEMPERATURE (°F) 200 USE: **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980 NTP 93 POSF 2980 + (JP-8 Additives) TEST DATE START: JP-8 BASELINE FUEL: TEST MATERIAL / FUEL EXPOSURE **EVALUATION OF TEST RESULTS** MATERIAL RESULTS OVERALL JP-8 JP-8 +100 JP8+100 (X4) PROPERTY TESTS OBSERVATIONS AND REFERENCES **EVALUATION** PRE POST PRE POST PRE POST JP8 +100 X4 (AVG. 5 SPECIMENS) COLOR PITTING (VISUAL) PITTING (MICROSCOPY) AVG. WT. (gms) GAIN / LOSS (gms) MICROSCOPY EVAL. SPEC. TEST RESULTS TEST FUEL / MATERIAL EXPOSURE CONTROL FUEL PRE (NEW) VS. POST (STRESSED 7 DAYS @ 325°F) **FUELS** 4 X 7 DAY PERIODS (28 DAYS) RANGE GENERAL FOR JP-8 PROPERTY TESTS* JP-8 JP-8 + 100JP-8 + 100 x4OBSERVATIONS 7 28 7 28 28 JP8 +100 X4 PRE POST PRE POST PRE POST MIN / MAX COLOR (7 DAYS) PRE POST PRE POST PRE POST CONDUCTIVITY (AVG. of 4) PS/M AT 72° F 150/600 GRAPHITE FURN/ICP (PPB) 7 DAY 28 DAY 7 DAY 28 DAY 7 DAY 28 DAY NOTES: **Metallic Color:** L =Light (No Deposit) L1 - L2 = Discoloration/Deposits **Fuel Color:** C =Clear C1 - C6 = Light to Dark **Designations:** NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting**W** = DATE: **Comparisons:** Within Allowable Requirement; 24 MAR 98 OT = Material Tested Beyond Temperature Range O = Outside Allowable Requirement UDRI TECH: A. BEHME N/A =Not applicable; CN = ControlUTC ENG: J. LEONE GT =Greater than 500 ppb LT = Less than 500 ppb UDRI P.I. ENG: D.H. KALT NSR = No Spec. Req. and/or 4 (x) Additive Concentration L. PERKINS A.F. AUT. W./MLSA: A.F. AUT. WL/POSF S. A. ANDERSON Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

²⁸⁸

IM42 MATERIAL / IDENTITY: 2014-T6 ALUMINUM, AMS 4029 TEST PLAN I.D. NO. TEST TEMPERATURE (°F) 200 AIRFRAME, FUEL SYSTEM **USE:**

EXPOSURE TIME (DAYS) 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /92 POSF 2926

2 DEC 97 92 POSF 2926 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST N	ATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST	RESULTS	5		
MATERIAL			RES	ULTS						OVERAL	L
PROPERTY TESTS	JF	P-8	JP-	8 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCE	E S	EV	VALUATIO	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST			JP8	+100	X4
COLOR	L	L	L	L L L L							W
PITTING (VISUAL)	ND	ND	2.2 2.2 2.2								W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND			CN	W	W
AVG. WT. (gms)	3.5644	3.5648	3.5375	3.5374	3.5485	3.5485					
GAIN / LOSS (gms)		+.0004		0001		.0000	Conductivity (%IACS) and Hardness Within Specification		CN	W	W
MICROSCOPY EVAL.											
	Т	EST FUE	L / MAT	ERIAL E	XPOSUR	E	CONTROL FUEL	SPEC.	TES	ST RESU	LTS

FUELS	T			ERIAL EX LIODS (28 D		E	P		CONTRO		YS @ 200°I	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JP	-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	7 28 7 28 7 28 C2 C2 C1 C1 C1 C1						POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C2	C1	C1	C1	C1	С	C1	C	C1	С	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	231	151	420	366	622	530	108	39	248	131	912	410	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

IM43 MATERIAL / IDENTITY: 4340 STEEL 280ksi, AMS 6415 TEST PLAN I.D. NO. TEST TEMPERATURE (°F) 325 AIRFRAME, FUEL SYSTEM **USE: EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /92 POSF 2926

16 SEP 97 92 POSF 2926 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST A	IATERIAI	/ FUEL EXP	OSLIDE			1		
		11231 1	IATEKIAL	/ FUEL EAR	OSUKE		EVALUATION OF TEST RESULTS)		
MATERIAL			RES	ULTS				(OVERAL	L
PROPERTY TESTS	JP	-8	JP-8	8 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	S) PRE POST PRE POST PRE POS					POST		JP8	+100	X4
COLOR	L	L2	L	L2	L	L2	Uniform Corrosion All Samples	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	25.3202	35.3203	25.4938	25.4944	25.5582	25.5582				
GAIN / LOSS (gms)		+.0001		+.0006		.0000		CN	W	W
MICROSCOPY EVAL.										

FUELS	Т	-		ERIAL EX IODS (28 D		E	P.		CONTRO S. POST (STR	-	YS @ 325°	F)	SPEC. RANGE		ST RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	- 100 x4	FOR JP-8	OBS	SERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C5	C2	C6	C2	C6	С	C2	C	C2	С	C2				
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	254	152	424	154	654	286	108	123	248	141	912	555	150/600			
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =Not Evaluated;

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRITECH:** A. BEHME

Not applicable; N/A =CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. II.M.1 / I.M.24 MATERIAL / IDENTITY: 6AL - 4V, TITANIUM TEST TEMPERATURE (°F) 325 USE: **ENGINE FUEL LINES & COMPONENTS** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980 28 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL: TEST DATE START:** 28 DEC 94 93 POSF 2980 + (JP-8 Additives) JP-8 BASELINE FUEL:

		TEST N	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	S		
MATERIAL			RES	ULTS				1	OVERAL	ւ
PROPERTY TESTS	JP	P-8	JP-	3 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L3	L	L2	L	L2	Discoloration / Surface Deposits - All Samples	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	9.2673	9.2677	9.3776	9.3781	9.3262	9.3264				1
GAIN / LOSS (gms)		+.0004		+.0005		+.0002		CN	W	W
MICROSCOPY EVAL.										

FUELS	T			ERIAL E		E	P		CONTRO S. POST (STE	_	YS @ 325°	F)	SPEC. RANGE		ST RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	SERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C3 C2 C3 C2 C3						C2	C	C2	C	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	31	14	230	28	669	146	50	4	300	57	569	241	150/600	0	0	0
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: C1 - C6 = Light to Dark $\mathbf{C} =$ Clear

Designations: NE =Not Evaluated; $ND = Not \ Detected; \quad BD = Below \ Detection$ P = Pitting

Comparisons: W =Within Allowable Requirement;

OT =Material Tested Beyond Temperature Range

N/A =Not applicable; Greater than 500 ppb GT =

NSR = No Spec. Req. and/or 4 (x) Additive Concentration O = Outside Allowable Requirement

LT = Less than 500 ppb

CN = Control

DATE: UDRI TECH: UTC ENG: **UDRI P.I. ENG:** A.F. AUT. W./MLSA: A.F. AUT. WL/POSF

24 APR 98 __A. BEHME J. LEONE D.H. KALT L. PERKINS S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists **Between Material Degradation and Fuel Properties Degradation**

TEST PLAN I.D. NO. MATERIAL / IDENTITY: 3AL - 2.5V, TITANIUM (TUBING) II.M.2 TEST TEMPERATURE (°F) 200 **ENGINE FUEL LINES & COMPONENTS** USE: **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

TEST DATE START: 15 OCT 96 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST M	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	,		
MATERIAL			RES	ULTS				(OVERAL	L
PROPERTY TESTS	JP	-8	JP-8	3 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L1	L	L	L	L		CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	4.4033	4.4031	4.4804	4.4803	4.4781	4.4780				
GAIN / LOSS (gms)		0002		0001		0001		CN	W	W
MICROSCOPY EVAL.										

		•	="	•		•										ji .
FUELS	Т			ERIAL EXIODS (28 D		E	P		CONTRO S. POST (STR	-	YS @ 200°	F)	SPEC. RANGE		ST RESU GENERAI	
PROPERTY TESTS*							JF	'- 8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	SERVATIO	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C2	C1	C1	C1	C1	С	C1	С	C1	С	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	181	109	504	273	897	473	108	39	248	131	912	410	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE GT =D.H. KALT

Greater than 500 ppb LT = Less than 500 ppb**UDRI P.I. ENG:** No Spec. Req. and/or 4 (x) Additive Concentration A.F. AUT. W./MLSA:

NSR =L. PERKINS A.F. AUT. WL/POSF S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. II.M.2 **MATERIAL / IDENTITY:** 3 Al-2.5V ,TITANIUM (TUBING) TEST TEMPERATURE (°F) 325 **USE:** ENGINE, FUEL LINES COMPONENTS 28 Betz Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL:** 5 DEC 96 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST M	IATERIAL .	FUEL EXF	POSURE		EVALUATION OF TEST RESULTS	$\overline{\mathbf{S}}$		
MATERIAL			RESU	JLTS					OVERAL	L
PROPERTY TESTS	JI	?-8	JP-8	+100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	EA	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L1	L	L1	L	L1	Discoloration All Samples	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	NE	NE	NE	NE	NE	NE				
GAIN / LOSS (gms)		NE		NE		NE		NE	NE	NE
MICROSCOPY EVAL.										

FUELS	T	EST FUE 4 X 7		ERIAL E IODS (28 I		RE	P		CONTRO S. POST (STR	_	YS @ 325°I	")	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	SERVATION	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	NE	NE	NE	С	C1	С	C1	С	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	NE	NE	NE	NE	NE	NE	108	123	248	141	912	555	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L = Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W = Within Allowable Requirement;

OT = Material Tested Beyond Temperature Range

N/A = Not applicable; GT = Greater than 500 ppb

NSR = No Spec. Req. and/or 4(x) Additive Concentration

O = Outside Allowable Requirement

CN = Control LT = Less than 500 ppb DATE: UDRI TECH: UTC ENG: UDRI P.I. ENG:

A.F. AUT. W./MLSA:

A.F. AUT. WL/POSF

24 APR 98
A. BEHME
J. LEONE
D.H. KALT
L. PERKINS
S. A. ANDERSON

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^{*} Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. MATERIAL / IDENTITY: 3AL - 2.5V, TITANIUM (TUBING) II.M.2 TEST TEMPERATURE (°F) 400 **ENGINE FUEL LINES & COMPONENTS** USE:

EXPOSURE TIME (DAYS) 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

TEST DATE START: 22 AUG 96 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST N	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RES	ULTS			
MATERIAL			RES	ULTS					OVE	RALL	
PROPERTY TESTS	JP	P-8	JP-	8 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES		EVALU	JATIO	N
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	i +1	100	X4
COLOR	L	L1	L	L1	L	L1	Discoloration All Samples	CN	7	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	1	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	7	W	W
AVG. WT. (gms)	4.1603	4.1604	4.4244	4.4244	4.5080	4.5079					
GAIN / LOSS (gms)		+.0001		.0000		0001		CN	7	W	W
MICROSCOPY EVAL.											
						-		- I			

FUELS	Т			ERIAL EX IODS (28 D		E	P		CONTRO S. POST (STR	_	YS @ 400°1	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JP	'-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	С3	С3	С3	С3	С3	С3	С	С3	С	С3	С	С3		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	226	10	483	69	861	415	108	5	248	5	912	428	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE GT =Greater than 500 ppb LT = Less than 500 ppb**UDRI P.I. ENG:** D.H. KALT

No Spec. Req. and/or 4 (x) Additive Concentration NSR =A.F. AUT. W./MLSA: L. PERKINS

A.F. AUT. WL/POSF S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. **II.M.3** MATERIAL / IDENTITY: HASTELLOY, NICKEL TEST TEMPERATURE (°F) 200 **ENGINE FUEL LINES & COMPONENTS** USE: **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

TEST DATE START: 20 OCT 94 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST N	MATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS			
MATERIAL			RES	ULTS					OVERAL	L
PROPERTY TESTS	JF	P-8	JP-	8 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L1	L	L1	L	L1		CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	17.2923	17.2923	17.0890	17.0890	16.9086	16.9082				
GAIN / LOSS (gms)		.0000		.0000		0004		CN	W	W
MICROSCOPY EVAL.										
	Т	EST FUE	L / MAT	ERIAL E	XPOSUR	E	CONTROL FUEL SPEC.	TES	T RESU	LTS
FUELS		4 X 7	DAY PER	IODS (28 D	DAYS)		PRE (NEW) VS. POST (STRESSED 7 DAYS @ 200°F) RANGE	(GENERA	L
PROPERTY TESTS*							.JP-8	OBS	ERVATION	ONS

FUELS	Т			ERIAL EXIODS (28 D		E	P		CONTRO S. POST (STR		YS @ 200°	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JP	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	С	С	С	С	С	С	С	С3	С	C3	C	С3		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	59	31	218	200	644	413	108	39	248	131	912	410	150/600	0	W	NSR
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY					1					
Ni																
Мо																
Cr																
Fe																

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement; DATE:

OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:**

N/A =Not applicable; CN = ControlUTC ENG:

GT =Greater than 500 ppb LT = Less than 500 ppb**UDRI P.I. ENG:** D.H. KALT NSR =No Spec. Req. and/or 4 (x) Additive Concentration A.F. AUT. W./MLSA:

L. PERKINS A.F. AUT. WL/POSF S. A. ANDERSON

A. BEHME

J. LEONE

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. **II.M.3** MATERIAL / IDENTITY: HASTELLOY, NICKEL TEST TEMPERATURE (°F) 325 **ENGINE FUEL LINES & COMPONENTS** USE: **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980 **TEST DATE START:** 23 NOV 94 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST N	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	S		
MATERIAL	TD	Q		ULTS	TDQ : 1	00 (V 4)	ODGEDWATIONS AND DEFENENCES		OVERAL	
PROPERTY TESTS	JP-8 JP-8 +100 JP8+100 (X4) PRE POST PRE POST PRE POST					00 (A4)	OBSERVATIONS AND REFERENCES	E	VALUATI	UN
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L1	L	L1	L	L1	Surface Discoloration - All Samples	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	17.6842	17.6844	17.3760	17.3764	17.1287	17.1282				
GAIN / LOSS (gms)		.0002		.0004		0005		CN	W	W
MICROSCOPY EVAL.										

	1	-		-	-	-	- 						arra -			
FUELS	T			ERIAL EX LIODS (28 D		E	P.		CONTRO S. POST (STR	_	YS @ 325°	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	- 100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C2	C2	C2	C2	C2	С	C2	С	C2	C	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	33	12	232	25	665	219	50	4	300	57	569	241	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement; DATE:

OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:**

N/A =Not applicable; CN = Control

GT =Greater than 500 ppb LT = Less than 500 ppb**UDRI P.I. ENG:** D.H. KALT NSR =No Spec. Req. and/or 4 (x) Additive Concentration A.F. AUT. W./MLSA: L. PERKINS

A.F. AUT. WL/POSF S. A. ANDERSON Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

A. BEHME

J. LEONE

UTC ENG:

Between Material Degradation and Fuel Properties Degradation

II.M.4 **MATERIAL / IDENTITY:** WASPALOY, NICKEL TEST PLAN I.D. NO.

TEST TEMPERATURE (°F) 200 **ENGINE FUEL LINES & COMPONENTS USE:**

EXPOSURE TIME (DAYS) 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

20 OCT 94 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST N	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	}		
MATERIAL PROPERTY TESTS	JP	-8		ULTS 3 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES		OVERALI ALUATIO	
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L1	L	L1	L	L1		CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	15.3851	15.3851	15.2743	15.2740	15.4495	15.4495				
GAIN / LOSS (gms)		.0000		0003		.0000		CN	W	W
MICROSCOPY EVAL.										

FUELS	Т			ERIAL EX IODS (28 D		E	P		CONTRO S. POST (STR	_	YS @ 200°	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JF	P-8	JP-8	+ 100	JP-8 +	- 100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C1	C1	C1	C1	C1	C1	С	C1	C	C1	C	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	62	27	223	134	645	423	108	39	248	131	912	410	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =

Comparisons: W =

DATE: 24 APR 98 Within Allowable Requirement; OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT

NSR =No Spec. Req. and/or 4 (x) Additive Concentration L. PERKINS A.F. AUT. W./MLSA: A.F. AUT. WL/POSF S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. II.M.4 MATERIAL / IDENTITY: WASPALOY, NICKEL

TEST TEMPERATURE (°F) 325 USE: ENGINE FUEL LINES & COMPONENTS
EXPOSURE TIME (DAYS) 28 TEST ADDITIVE/FUEL: Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

TEST DATE START: 23 NOV 94 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST N	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULT	S		
MATERIAL			RES	ULTS					OVERAL	L
PROPERTY TESTS	JP	-8	JP-8	3 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	E	VALUATI	.ON
(AVG. 5 SPECIMENS)	PRE	PRE POST PRE POST PRE POST L L2 L L2 L L1						JP8	+100	X4
COLOR	L	L2	L	L2	L	L1	Discoloration - JP-8 & +100 Samples	CN	W	W
PITTING (VISUAL)	ND							CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	15.4751	15.4768	15.3855	15.3864	15.4662	15/4663				
GAIN / LOSS (gms)		+.0017		+.0009		+.0001		CN	W	W
MICROSCOPY EVAL.										
_	<u> </u>	<u>.</u>			•	<u>.</u>		7	•	

		=		="		=	="									
FUELS	Т			ERIAL EXIODS (28 D		E	P		CONTRO S. POST (STE	_	YS @ 325°	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	- 100 x4	FOR JP-8	OBS	SERVATION	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C2	C2	C2	C2	C2	С	C2	С	C2	С	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	36	10	227	10	657	253	50	4	300	57	569	241	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L = Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W = Within Allowable Requirement; DATE: 24 APR 98

OT = Material Tested Beyond Temperature Range O = Outside Allowable Requirement UDRI TECH: A. BEHME
N/A = Not applicable; CN = Control UTC ENG: J. LEONE

N/A = Not applicable; CN = Control UTC ENG: J. LEONE
GT = Greater than 500 ppb LT = Less than 500 ppb UDRI P.I. ENG: D.H. KALT

NSR = No Spec. Req. and/or 4 (x) Additive Concentration

A.F. AUT. W./MLSA:

L. PERKINS

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. II.M.5 MATERIAL / IDENTITY: INCO 625, NICKEL ALLOY, AMS 55990
TEST TEMPERATURE (°F) 200 USE: ENGINE FUEL LINES & COMPONENTS

EXPOSURE TIME (DAYS) 28 TEST ADDITIVE/FUEL: Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

TEST DATE START: 20 OCT 94 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST N	MATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	5		
MATERIAL			RES	ULTS					OVERAL	L
PROPERTY TESTS	JP	·-8	JP-8	3 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	E	VALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L1	L	L1	L	L1		CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	17.1228	17.1227	17.2875	17.2877	17.2053	17.2056				
GAIN / LOSS (gms)		0001		+.0002		+.0003		CN	W	W
MICROSCOPY EVAL.							_			
	т	DOT DUE	T / N/LATE	EDIVI E.	VDOCTID	E	CONTROL FLIFI SPEC	TE	T DECI	II TC

FUELS	Т			ERIAL EX TODS (28 D		E	P		CONTRO S. POST (STR	-	YS @ 200°	F)	SPEC. RANGE		ST RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	- 100 x4	FOR JP-8	OBS	SERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C	C2	С	С	C	С	С	C1	C	C1	C	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	56	34	208	158	635	423	108	39	248	131	912	410	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L = Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W = Within Allowable Requirement; DATE: 24 APR 98

OT = Material Tested Beyond Temperature Range O = Outside Allowable Requirement UDRI TECH: A. BEHME
N/A = Not applicable; CN = Control UTC ENG: J. LEONE

N/A = Not applicable; CN = Control UTC ENG: J. LEONE

GT = Greater than 500 ppb LT = Less than 500 ppb UDRI P.I. ENG: D.H. KALT_____

^{*} Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

II.M.5 **MATERIAL / IDENTITY:** INCO 625, NICKEL ALLOY, AMS 55990 TEST PLAN I.D. NO. TEST TEMPERATURE (°F) 325 ENGINE FUEL LINES & COMPONENTS **USE:**

EXPOSURE TIME (DAYS) 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

23 NOV 94 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST N	MATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST	RESULTS	5		
MATERIAL			RES	ULTS					(OVERAL	L
PROPERTY TESTS	JP	-8	JP-8	8 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCE	ES	EV	VALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST			JP8	+100	X4
COLOR	L	L2	L	L1	L	L	Surface Deposits / Discoloration - JP-8		CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND	Minimum Deposits - +100		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND			CN	W	W
AVG. WT. (gms)	17.2607	17.2618	17.3816	17.3819	17.3208	17.3208					
GAIN / LOSS (gms)		+.0011		+.0003		.0000			CN	W	W
MICROSCOPY EVAL.											
	Т	EST FUE	L / MAT	ERIAL E	XPOSUR	E	CONTROL FUEL	SPEC.	TES	ST RESU	LTS

FUELS	Т			ERIAL EX IODS (28 D		E	P		CONTRO S. POST (STR	_	YS @ 325°	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	С3	С3	С3	C4	С3	C	C2	C	C2	C	C2		W	W	0
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	31	34	228	85	655	381	50	4	300	57	569	241	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =Not Evaluated;

Comparisons: W =

DATE: 24 APR 98 Within Allowable Requirement; OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

Not applicable; N/A =CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. II.M.6 /I.M.16 MATERIAL / IDENTITY: INCO 718, NICKEL ALLOY, AMS 5596G
TEST TEMPERATURE (°F) 200 USE: ENGINE FUEL LINES & COMPONENTS

EXPOSURE TIME (DAYS) 28 TEST ADDITIVE/FUEL: Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

TEST DATE START: 20 OCT 94 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST N	MATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESUL	ΓS		
MATERIAL			RES	ULTS					OVERAL	.L
PROPERTY TESTS	JP	·-8	JP-3	8 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	E	VALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L	L	L	L	L		CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	16.1202	16.1205	16.0297	16.0296	16.0787	16.0786				
GAIN / LOSS (gms)		+.0003		0001		0001		CN	W	W
MICROSCOPY EVAL.										
_		DOD DIE	T /3 T / 75	EDIAL E	VD O CIVID		CONTENDED FIXER	TOTAL STATE OF THE	OF PEGE	T TO
FUELS	T	-		ERIAL E LIODS (28 D		Е	CONTROL FUEL PRE (NEW) VS. POST (STRESSED 7 DAYS @ 200°F) RANGE		ST RESU GENERA	

FUELS	T			ERIAL EX LIODS (28 D		E	P		CONTRO S. POST (STR		YS @ 200°	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JP	-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C	C2	С	С	С	С	С	C1	C	C1	С	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	54	35	219	153	651	433	108	39	248	131	912	410	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L = Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W = Within Allowable Requirement; DATE: 24 APR 98

OT = Material Tested Beyond Temperature Range O = Outside Allowable Requirement UDRI TECH: A. BEHME
N/A = Not applicable; CN = Control UTC ENG: J. LEONE

NSR = No Spec. Req. and/or 4 (x) Additive Concentration

A.F. AUT. W./MLSA:

L. PERKINS

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

MATERIAL / IDENTITY: INCO 718, NICKEL ALLOY, AMS 5596G TEST PLAN I.D. NO. II.M.6 /I.M.16 TEST TEMPERATURE (°F) 325 ENGINE FUEL LINES & COMPONENTS **USE:**

EXPOSURE TIME (DAYS) 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980 23 NOV 94 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

	П	TEST N	MATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	;		
MATERIAL			RES	ULTS					OVERAL	L
PROPERTY TESTS	JP	-8	JP-	8 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L2	L	L1	L	L1	Surface Deposits - All Samples	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	15.9657	15.9676	16.1168	16.1175	16.0261	16.0266				
GAIN / LOSS (gms)		0081		+.0007		+.0005		CN	W	W
MICROSCOPY EVAL.										
				-						

FUELS	Т			ERIAL EX IODS (28 D		E	P		CONTRO S. POST (STR	_	YS @ 325°	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JF	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	С3	C2	С3	C2	C5	С	C2	C	C2	C	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	38	11	227	13	649	203	50	4	300	57	569	241	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =Not Evaluated;

Comparisons:

W =DATE: 24 APR 98 Within Allowable Requirement; OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

Not applicable; N/A =CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

MATERIAL / IDENTITY: STELLITE 30, CHROMIUM / CARBIDE TEST PLAN I.D. NO. **II.M.7** TEST TEMPERATURE (°F) 325 **ENGINE FUEL LINES & COMPONENTS USE:**

EXPOSURE TIME (DAYS) 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

6 DEC 95 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST N	1ATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	3		
MATERIAL			RES	ULTS				(OVERAL	L
PROPERTY TESTS	JP	-8	JP-8	8 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L2	L	L2	L	L1		CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	20.6815	20.6814	20.7455	20.7450	20.5303	20.5295				
GAIN / LOSS (gms)		0001		0005		0008		CN	W	W
MICROSCOPY EVAL.										
	Т	FST FIIF	I./MAT	ERIAL E	XPOSUR	F	CONTROL FUEL SPEC.	TES	T RESU	LTS

FUELS	Т			ERIAL EXIODS (28 D		E	P		CONTRO	_	YS @ 325°l	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JF	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C4	C5	C4	C5	C4	C5	C	C2	C	C2	C	C2		0	0	0
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	234	139	496	209	761	442	108	123	248	141	912	555	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Со	13	2	19	15	26	24	NE		NE		NE			NE	NE	NE
Cr	2	2	30	45	10	59	NE		NE		NE			NE	NE	NE
Ni	2	ND	1	ND	2	18	NE		NE		NE			NE	NE	NE
Мо	ND	ND	ND	2	ND	3	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L =L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =Not Evaluated;

Comparisons: W = Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

Not applicable; N/A =CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

MATERIAL / IDENTITY: 347 STAINLESS STEEL TEST PLAN I.D. NO. II.M.8 /I.M.18

TEST TEMPERATURE (°F) 325 **ENGINE FUEL LINES & COMPONENTS USE: EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

20 0CT 94 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST N	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	5		
MATERIAL			RES	ULTS				(OVERAL	.L
PROPERTY TESTS	JP	-8	JP-8	8 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	EV	VALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L1	L	L1	L	L1	Minimum Surface Deposits / Discoloration - All Samples	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	15.9066	15.9074	15.8288	15.8299	15.8661	15.8661				
GAIN / LOSS (gms)		+.0008		+.0011		.0000		CN	W	W
MICROSCOPY EVAL.										

FUELS	Т			ERIAL EX TODS (28 D		E	P		CONTRO S. POST (STR	_	YS @ 325°	F)	SPEC. RANGE		ST RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	- 100 x4	FOR JP-8	OBS	SERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C	C5	С	C5	С	C5	С	C2	С	C2	С	C2		0	0	0
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	53	4	228	14	665	360	50	4	300	57	569	241	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
3	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =Not Evaluated;

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

IIM9 **MATERIAL / IDENTITY:** GREEK ASCOLOY, STAINLESS STEEL TEST PLAN I.D. NO. TEST TEMPERATURE (°F) ENGINE FUEL LINES & COMPONENTS 200 **USE:**

EXPOSURE TIME (DAYS) 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

20 OCT 94 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST M	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS)		
MATERIAL PROPERTY TESTS	JР	-8		ULTS 3 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES		OVERALI ALUATIO	
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L1	L	L1	L	L1		CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	12.2655	12.2658	12.2628	12.2630	12.2904	12.2905				1
GAIN / LOSS (gms)		+.0003		+.0002		+.0001		CN	W	W
MICROSCOPY EVAL.										

FUELS	Т			ERIAL EX IODS (28 D		E	P		CONTRO S. POST (STR	_	YS @ 325°	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JF	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C	C2	С	С	C	C	С	C2	C	C2	C	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	54	35	219	153	651	433	50	4	248	131	912	410	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =Not Evaluated;

Comparisons: W = Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

Not applicable; N/A =CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT

NSR =No Spec. Req. and/or 4 (x) Additive Concentration L. PERKINS A.F. AUT. W./MLSA: A.F. AUT. WL/POSF S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

Between Material Degradation and Fuel Properties Degradation

IIM9 **MATERIAL / IDENTITY:** GREEK ASCOLOY, STAINLESS STEEL TEST PLAN I.D. NO. TEST TEMPERATURE (°F) 325 **ENGINE FUEL LINES & COMPONENTS USE: EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

23 NOV 94 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST M	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	8		
MATERIAL PROPERTY TESTS	.IP	-8		ULTS 8 +100	.IP8+1	00 (X4)	OBSERVATIONS AND REFERENCES		OVERAL!	
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST	OBSERVATIONS AND REFERENCES	JP8	+100	X4
COLOR	L	L2	L	L2	L	L1	Surface Deposits/ Discoloraion - JP-8 and +100	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND	The second secon	CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	12.2892	12.2906	12.2251	12.2258	12.2965	12.2968				<u> </u>
GAIN / LOSS (gms)		+.0014		+.0007		+.0003		CN	W	W
MICROSCOPY EVAL.										<u> </u>

FUELS	Т			ERIAL EX LIODS (28 D		E	P.		CONTRO S. POST (STE	_	YS @ 325°	F)	SPEC. RANGE		ST RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	- 100 x4	FOR JP-8	OBS	SERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C2	C2	C2	C2	C2	С	C2	С	C2	C	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	40	9	229	13	650	242	50	4	300	57	569	241	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =Not Evaluated;

Comparisons:

W =Within Allowable Requirement; DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

MATERIAL / IDENTITY: 30302, AMS 5688H (S.S WIRE) TEST PLAN I.D. NO. IIM10/IM19 TEST TEMPERATURE (°F) 325 **ENGINE FUEL LINES & COMPONENTS USE:**

EXPOSURE TIME (DAYS) 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

23 NOV 94 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST M	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULT	\mathbf{S}		
MATERIAL			RES	ULTS					OVERAL	L
PROPERTY TESTS	JP	-8	JP-8	8 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	EV	VALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L2	L	L	L	L	Surface Deposits/ Discoloration - JP-8 Only	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	2.1747	2.1750	2.0886	2.0887	2.2335	2.2335				
GAIN / LOSS (gms)		+.0003		+.0001		.0000		CN	W	W
MICROSCOPY EVAL.										

FUELS	Т			ERIAL EX IODS (28 D		Œ	P		CONTRO S. POST (STR	_	YS @ 325°l	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JF	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	С3	C4	С3	C4	С3	С3	С	C2	C	C2	C	C2		0	0	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	133	23	247	33	555	214	108	123	248	141	912	555	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =Not Evaluated;

Comparisons: W =

DATE: 24 APR 98 Within Allowable Requirement; OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

Not applicable; N/A =CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

MATERIAL / IDENTITY: 440C, STAINLESS STEEL TEST PLAN I.D. NO. IIM11/IM17

TEST TEMPERATURE (°F) 325 **ENGINE FUEL LINES & COMPONENTS USE: EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

3 MAR 95 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST N	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	5		
MATERIAL			RES	ULTS				(OVERAL	L
PROPERTY TESTS	JP	-8	JP-	8 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	EV	ALUATI	.ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L2	L	L1	L	L1	Heavy Discoloration -JP-8 Only	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	25.4359	25.4373	25.4543	25.4549	25.4178	25.4183				
GAIN / LOSS (gms)		+.0014		+.0006		+.0005		CN	W	W
MICROSCOPY EVAL.										

FUELS	Т			ERIAL EXIODS (28 D		E	P		CONTRO S. POST (STR	_	YS @ 325°	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*					/		JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C4	C4	C4	C4	C4	С	C2	C	C2	C	C2		0	0	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	163	43	258	69	562	305	108	123	248	141	912	555	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Fe	NE	44	NE	175	NE	260	NE		NE		NE			NE	NE	NE
Cr	NE	ND	NE	5	NE	5	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =Not Evaluated;

Comparisons: W =

DATE: 24 APR 98 Within Allowable Requirement; OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

Not applicable; N/A =CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. IIM12/IM15 MATERIAL / IDENTITY: 304 STAINLESS STEEL

TEST TEMPERATURE (°F) 325 USE: ENGINE FUEL LINES & COMPONENTS

EXPOSURE TIME (DAYS) 28 TEST ADDITIVE/FUEL: Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

TEST DATE START: 20 OCT 94 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

			, 1 0 2 2 2 2 1 1	OSURE		EVALUATION OF TEST RESULT	5		
		RESU	JLTS					OVERAL	L
JP-8		JP-8	+100	JP8+10	00 (X4)	OBSERVATIONS AND REFERENCES	E	VALUATI	ON
PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
L	L3	L	L2	L	L1	Discoloration -JP-8 and +100	CN	W	W
ND	ND	ND	ND	ND	ND		CN	W	W
ND	ND	ND	ND	ND	ND		CN	W	W
.6028 1	5.6033	15.4867	15.4869	15.4193	15.4194				
-	+.0005		+.0002		+.0001		CN	W	W
I N	RE L D D 5028 1	RE POST L I3 D ND D ND	JP-8 JP-8 RE POST PRE L L3 L D ND ND ND D ND ND 1028 15.6033 15.4867	JP-8 JP-8 +100 RE POST PRE POST L L3 L L2 D ND ND ND D ND ND ND 5028 15.6033 15.4867 15.4869	JP-8 JP-8 +100 JP8+10 RE POST PRE POST PRE L L3 L L2 L D ND ND ND ND D ND ND ND ND 6028 15.6033 15.4867 15.4869 15.4193	JP-8 JP-8 +100 JP8+100 (X4) RE POST PRE POST L L3 L L2 L L1 D ND ND ND ND ND D ND ND ND ND ND 5028 15.6033 15.4867 15.4869 15.4193 15.4194	JP-8 JP-8 + 100 JP8+100 (X4) OBSERVATIONS AND REFERENCES RE	JP-8 JP-8 + 100 JP8+100 (X4) OBSERVATIONS AND REFERENCES EVALUATIONS AND REFERENCES EVALUAT	JP-8 JP-8 + 100 JP8+100 (X4) OBSERVATIONS AND REFERENCES EVALUATIONS AND REFERENCES RE

		=	="	="		=	="									
FUELS	Т			ERIAL EXIODS (28 D		E	P		CONTRO S. POST (STE	_	YS @ 325°	F)	SPEC. RANGE		ST RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	- 100 x4	FOR JP-8	OBS	SERVATION	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	С	C5	C	C5	С	C5	С	C2	C	C2	С	C2		0	0	0
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	51	4	229	53	662	306	50	4	300	57	569	241	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L = Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W = Within Allowable Requirement; DATE: <u>24 APR 98</u>

OT = Material Tested Beyond Temperature Range O = Outside Allowable Requirement UDRI TECH: A. BEHME
N/A = Not applicable; CN = Control UTC ENG: J. LEONE

N/A = Not applicable; CN = Control UTC ENG: J. LEONE
GT = Greater than 500 ppb LT = Less than 500 ppb UDRI P.I. ENG: D.H. KALT

NSR = No Spec. Req. and/or 4 (x) Additive Concentration

A.F. AUT. W./MLSA:

L. PERKINS

A.F. AUT. WL/POSF

S. A. ANDERSON

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

IIM13/IM13 **MATERIAL / IDENTITY:** 316 STAINLESS STEEL TEST PLAN I.D. NO.

TEST TEMPERATURE (°F) 325 **ENGINE FUEL LINES & COMPONENTS USE:**

EXPOSURE TIME (DAYS) 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

28 DEC 94 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST N	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	3		
MATERIAL				ULTS	1				OVERALI	
PROPERTY TESTS	JP	-8	JP-8	8 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L2	L	L2	L	L1	Discoloration -JP-8 and +100	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	14.7166	14.7171	14.7032	14.7045	13.9722	13.9721				
GAIN / LOSS (gms)		+.0004		+.0013		0001		CN	W	W
MICROSCOPY EVAL.										

FUELS	Т			ERIAL EX IODS (28 D		E	P		CONTRO S. POST (STR	_	YS @ 325°	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JF	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	С3	С3	С3	С3	C4	С	C2	C	C2	C	C2		W	W	0
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	34	11	225	19	669	171	50	4	300	57	569	241	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =Not Evaluated;

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT

NSR =No Spec. Req. and/or 4 (x) Additive Concentration L. PERKINS A.F. AUT. W./MLSA:

A.F. AUT. WL/POSF S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

MATERIAL / IDENTITY: 321 STAINLESS STEEL TEST PLAN I.D. NO. IIM14/IM14

TEST TEMPERATURE (°F) 325 **ENGINE FUEL LINES & COMPONENTS USE: EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

28 DEC 94 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST M	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS								
MATERIAL			RES	ULTS				OVERALL							
PROPERTY TESTS	JP-8 JP-8 +100 JP8+100 (X4) PRE POST PRE POST PRE POST PRE POST						OBSERVATIONS AND REFERENCES	EV	ALUATI	ON					
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4					
COLOR	L	L3	L	L2	L	L2	Discoloration All Samples	CN	W	W					
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W					
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W					
AVG. WT. (gms)	19.5901	19.5907	19.3892	19.3895	19.3470	19.3470									
GAIN / LOSS (gms)		+.0006		+.0003		.0000		CN	W	W					
MICROSCOPY EVAL.															

FUELS									CONTRO	F)	SPEC. RANGE	TEST RESULTS GENERAL				
PROPERTY TESTS*							JP	-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBSERVATIONS		ONS
	7	7 28 7 28 7 28 C2 C3 C3 C3 C2 C3					PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	С3	С3	С3	C2	С3	С	C2	C	C2	C	C2		W	W	0
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	31	19	226	25	660	174	50	4	300	57	569	241	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =

Comparisons:

W =DATE: 24 APR 98 Within Allowable Requirement; OT = Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT NSR =

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

IIM16 **MATERIAL / IDENTITY:** AS1 51410 SS (AMS 5504-J) TEST PLAN I.D. NO.

TEST TEMPERATURE (°F) 325 **ENGINE FUEL LINES & COMPONENTS USE: EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

28 DEC 94 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST M	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS								
MATERIAL	.IP	-8		ULTS 3 +100	IP8±1	00 (X4)	ODCEDUATIONS AND DEFEDENCES		OVERAL						
PROPERTY TESTS	02 0 02 0 02 0 0 0 0 0 0 0 0 0 0 0 0 0						OBSERVATIONS AND REFERENCES	E V	ALUATI	UN					
(AVG. 5 SPECIMENS)	PRE POST PRE POST PRE POST L 1.2 L L.1 L L.1					POST		JP8	+100	X4					
COLOR	L	L2	L	L1	L	L1	Discoloration All Samples	CN	W	W					
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W					
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W					
AVG. WT. (gms)	15.7410	15.7419	15.3358	15.3358	15.5889	15.5885				1					
GAIN / LOSS (gms)		+.0009		.0000		0004		CN	W	W					
MICROSCOPY EVAL.										1					

FUELS	Т			ERIAL EX RIODS (28 D		E	P		CONTRO S. POST (STR	_	F)	SPEC. RANGE	TEST RESULTS GENERAL			
PROPERTY TESTS*							JF	P-8	JP-8	+ 100	JP-8 +	- 100 x4	FOR JP-8	OBSERVATIONS		ONS
	7	7 28 7 28 7 28 C2 C4 C3 C3 C2 C3						POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C4	С3	С3	C2	С3	С	C2	C	C2	С	C2		0	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	32	16	221	35	654	180	108	39	248	131	912	410	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Cr	NE	ND	NE	ND	NE	ND	NE		NE		NE			NE	NE	NE
Fe	NE	ND	NE	50	NE	500	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =Not Evaluated;

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

Not applicable; N/A =CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT NSR =No Spec. Req. and/or 4 (x) Additive Concentration L. PERKINS A.F. AUT. W./MLSA:

A.F. AUT. WL/POSF S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

MATERIAL / IDENTITY: 440 STAINLESS STEEL TEST PLAN I.D. NO. **IIM17/IIM11** TEST TEMPERATURE (°F) 325 **ENGINE FUEL LINES & COMPONENTS USE:**

EXPOSURE TIME (DAYS) 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

4 JAN 96 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST M	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS								
MATERIAL	.IP	0		ULTS 8 +100	TDO.1	00 (V4)	ODGEDWATIONS AND DEFENENCES		OVERAL						
PROPERTY TESTS	02 0 12 0 12 0 12 0 12 0 12 0 12 0 12 0						OBSERVATIONS AND REFERENCES	EV	ALUATI	UN					
(AVG. 5 SPECIMENS)	PRE POST PRE POST PRE POST L L2 L L1 L L1					POST		JP8	+100	X4					
COLOR	L	L2	L	L1	L	L1	Discoloration JP-8 Only / Deposits All Samples	CN	W	W					
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W					
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W					
AVG. WT. (gms)	14.8677	14.8643	11.5992	11.5932	15.5772	15.5748				1					
GAIN / LOSS (gms)		0034		0060		0024		CN	W	W					
MICROSCOPY EVAL.										1					

FUELS	T	-		ERIAL EX IODS (28 D		E	P		CONTRO S. POST (STR	_	F)	SPEC. RANGE	TEST RESULTS GENERAL			
PROPERTY TESTS*							JP	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C2	C2	C2	C2	C2	С	C2	C	C2	C	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	97	4	435	48	699	429	108	123	248	141	912	555	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Cr	2	ND	29	5	26	5	NE		NE		NE			NE	NE	NE
Fe	12	44	118	175	185	260	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =Not Evaluated;

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

Not applicable; N/A =CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT NSR =

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

IIM18 **MATERIAL / IDENTITY: CPM 10V, FERROUS** TEST PLAN I.D. NO. TEST TEMPERATURE (°F) 325 **ENGINE FUEL LINES & COMPONENTS USE:**

EXPOSURE TIME (DAYS) 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

1 AUG 95 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST N	MATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESUI	LTS		
MATERIAL			RES	ULTS					OVERAL	L
PROPERTY TESTS	JP-8 JP-8 +100 JP8+100 (X4) PRE POST PRE POST PRE POST					00 (X4)	OBSERVATIONS AND REFERENCES	E	VALUATI	ION
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L2	L	L2	L	L2	Uniform Corrosion All Samples	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P		CN	W	W
AVG. WT. (gms)	14.8677	14.8643	11.5992	11.5932	15.5772	15.5748	Pitting All Samples ~ Depth .0016 ²			
GAIN / LOSS (gms)		0034		0060		0024		CN	W	W
MICROSCOPY EVAL.										
	TEST FILET / MATERIAL EXPOSIDE						CONTROL FUEL SPEC	TE	CT DECI	II TC

FUELS	Т	-		ERIAL EX LIODS (28 D		E	P		CONTRO S. POST (STR	_	F)	SPEC. RANGE	TEST RESULTS GENERAL			
PROPERTY TESTS*							JF	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBSERVATIONS		ONS
	7	7 28 7 28 7 28 C2 C3 C2 C2 C2 C3						POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	С3	C2	C2	C2	С3	С	C2	C	C2	C	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	145	26	312	30	537	324	108	123	248	141	912	555	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Fe	50	180	200	320	1050	1600	NE		NE		NE			NE	NE	NE
V	ND	ND	ND	60	30	110	NE		NE		NE			NE	NE	NE
Cr	ND	6	10	8	15	12	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =Not Evaluated;

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT

Fuel Property Test Data Was Collected to Es tablish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

IIM19/IM10 **MATERIAL / IDENTITY:** C-355-T6, CAST ALUMINUM TEST PLAN I.D. NO. TEST TEMPERATURE (°F) 325 **ENGINE FUEL LINES & COMPONENTS USE:**

EXPOSURE TIME (DAYS) 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

21 DEC 94 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

	TEST N	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULT	S	·	
		RES	ULTS					OVERAL	L
JP-8 JP-8 +100 JP8+100 (X4) PRE POST PRE POST PRE POST					00 (X4)	OBSERVATIONS AND REFERENCES	E	VALUATI	ON
PRE POST PRE POST PRE POST L L2 L L1 L L1				PRE	POST		JP8	+100	X4
L	L2	L	L1	L	L1	Heavy Deposits / Discoloration -JP-8	CN	W	W
ND	ND	ND	ND	ND	ND		CN	W	W
ND	ND	ND	ND	ND	ND		CN	W	W
1.0157	1.0155	.9658	.9657	1.0152	1.0151				
	0002		0001		0001		CN	W	W
						Conductivity (%IACS) and Hardness Within Specification			
	PRE L ND ND	JP-8 PRE POST L L2 ND ND ND ND 1.0157 1.0155	RES JP-8 JP-1	RESULTS JP-8 JP-8 + 100 PRE POST PRE POST L L2 L L1 ND ND ND ND ND ND ND ND 1.0157 1.0155 .9658 .9657	JP-8 JP-8 +100 JP8+1 PRE POST PRE POST PRE L L2 L L1 L ND ND ND ND ND ND ND ND ND ND 1.0157 1.0155 .9658 .9657 1.0152	RESULTS JP-8 JP8 + 100 JP8+100 (X4) PRE POST PRE POST L L2 L L1 L L1 ND ND ND ND ND ND ND ND ND ND ND ND 1.0157 1.0155 .9658 .9657 1.0152 1.0151	RESULTS	RESULTS	No. No.

	TEST FUEL / MATERIAL EXPOS															
FUELS	Т			ERIAL EXIODS (28 D		E	P		CONTRO S. POST (STE	_	F)	SPEC. RANGE	TEST RESULTS GENERAL			
PROPERTY TESTS*								P-8	JP-8	+ 100	JP-8 +	- 100 x4	FOR JP-8	OBS	SERVATION	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	С3	C2	С3	С3	С3	С	C2	C	C2	С	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	29	35	230	97	690	339	50	4	300	57	569	241	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =

Comparisons:

W = $Within\ Allowable\ Requirement;$ DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT NSR =No Spec. Req. and/or 4 (x) Additive Concentration L. PERKINS A.F. AUT. W./MLSA:

A.F. AUT. WL/POSF S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

IIM20/IM11 **MATERIAL / IDENTITY:** C-356-T6, CAST ALUMINUM TEST PLAN I.D. NO. TEST TEMPERATURE (°F) 325 **ENGINE FUEL LINES & COMPONENTS USE:**

EXPOSURE TIME (DAYS) 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

14 DEC 94 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST N	MATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST	RESULTS	•		
MATERIAL			RES	ULTS					(OVERALI	L
PROPERTY TESTS	JI	P-8	JP-	8 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENC	E S	EV	ALUATIO	.ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST			JP8	+100	X4
COLOR	L	L2	L	L1	L	L1	Heavy Deposits / Discoloration -JP-8		CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND			CN	W	W
PITTING (MICROSCOPY)	ND	P	ND	ND	ND	ND			CN	W	W
AVG. WT. (gms)	1.0157	1.0155	.9658	.9657	1.0152	1.0151	Minimum Pitting JP-8 Only			1	
GAIN / LOSS (gms)		0002		0001		0001			CN	W	W
MICROSCOPY EVAL.							Conductivity (%IACS) and Hardness Within Specification				
						-					
	T	EST FUE	L / MAT	ERIAL E	XPOSUR	E	CONTROL FUEL	SPEC.	TES	T RESU	LTS
FUELS		4 X 7	DAY PER	RIODS (28 E	DAYS)		PRE (NEW) VS. POST (STRESSED 7 DAYS @ 325°F)	RANGE	(GENERAI	L

FUELS	T	-		ERIAL E		E	P		CONTRO S. POST (STR	_	YS @ 325°l	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JP	-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	С3	C2	С3	С3	С3	С	C2	C	C2	C	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	29	35	230	97	690	339	50	4	300	57	569	241	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT

NSR =No Spec. Req. and/or 4 (x) Additive Concentration L. PERKINS A.F. AUT. W./MLSA: A.F. AUT. WL/POSF S. A. ANDERSON

IIM21 **MATERIAL / IDENTITY:** A 286, SIVER PLATE, AMS 5525 TEST PLAN I.D. NO. TEST TEMPERATURE (°F) 200 **ENGINE FUEL LINES & COMPONENTS USE:**

EXPOSURE TIME (DAYS) 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

1 DEC 96 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST N	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	5		
MATERIAL	.IP	0		ULTS 3 +100	I IDO . 1	00 (X4)	ODGEDWATIONS AND DEFENENCES		OVERAL	
PROPERTY TESTS	JF	-0	JF-6	5 +100	JF6+1	00 (A4)	OBSERVATIONS AND REFERENCES	EV	ALUATI	UN
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L2	L	L1	L	L1	Voids In Silver Plate	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P	Pitting In Voids - All Samples	CN	W	W
AVG. WT. (gms)	15.9213	15.9212	16.1333	16.1332	15.8447	15.8446				1
GAIN / LOSS (gms)		0001		0001		0001		CN	W	W
MICROSCOPY EVAL.										

FUELS	Т			ERIAL EX IODS (28 D		E	P		CONTRO S. POST (STR	_	YS @ 325°	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JF	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C1	C2	C1	C1	C1	C1	С	C2	C	C2	C	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	33	27	230	153	674	373	108	39	248	131	912	410	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT

NSR =No Spec. Req. and/or 4 (x) Additive Concentration L. PERKINS A.F. AUT. W./MLSA:

A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. IIM21 MATERIAL / IDENTITY: A 286, SIVER PLATE, AMS 5525

TEST TEMPERATURE (°F) 325 USE: ENGINE FUEL LINES & COMPONENTS

EXPOSURE TIME (DAYS) 28 TEST ADDITIVE/FUEL: Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

TEST DATE START: 23 NOV 96 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST N	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	5		
MATERIAL			RES	ULTS					OVERAL	ւ
PROPERTY TESTS	JP	-8	JP-8	8 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L3	L	L3	L	L3	Voids In Silver Plate / Discoloration All Samples	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P	Pitting In Voids - All Samples	CN	W	W
AVG. WT. (gms)	15.8992	15.8998	15.8581	15.8586	15.8376	15.8376				1
GAIN / LOSS (gms)		+.0006		+.0005		.0000		CN	W	W
MICROSCOPY EVAL.										1

FUELS	Т			ERIAL EX IODS (28 D		E	P		CONTRO S. POST (STR	_	YS @ 325°	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JF	P-8	JP-8	+ 100	JP-8 +	- 100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C2	C2	C2	C2	C2	С	C2	C	C2	С	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	37	7	230	10	661	241	50	4	300	57	569	241	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Fe	5	22	250	150	100	106	NE		NE		NE			NE	NE	NE
Ag	12	ND	10	3	40	15	NE		NE		NE			NE	NE	NE
Fe (ICP)	ND	ND	52	69	128	120	NE		NE		NE			NE	NE	NE
Ag (ICP)	4	7	7	12	7	14	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L = Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W = Within Allowable Requirement; DATE: 24 APR 98

OT = Material Tested Beyond Temperature Range O = Outside Allowable Requirement UDRI TECH: A. BEHME
N/A = Not applicable; CN = Control UTC ENG: J. LEONE

NSR = No Spec. Req. and/or 4 (x) Additive Concentration

A.F. AUT. W./MLSA:

L. PERKINS

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

IIM22 **MATERIAL / IDENTITY: NITRALLOY, 135 MODIFIED** TEST PLAN I.D. NO.

TEST TEMPERATURE (°F) 200 ENGINE FUEL LINES & COMPONENTS **USE: EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

23 NOV 96 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST N	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	5		
MATERIAL			RES	ULTS					OVERAL	L
PROPERTY TESTS	JP	-8	JP-8	3 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L1	L	L1	L	L1	Localized Uniform Corrosion - All Samples	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	24.1812	24.1807	23.8826	23.8821	24.0495	24.0489				
GAIN / LOSS (gms)		0005		0005		0006		CN	W	W
MICROSCOPY EVAL.										

FUELS	Т			ERIAL EX IODS (28 D		E	P		CONTRO S. POST (STR	_	YS @ 200°	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JF	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C1	C1	C1	C1	C1	C1	С	C1	C	C1	С	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	232	106	534	326	978	576	108	39	248	131	912	410	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Fe	10	30	60	60	110	80	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =Not Evaluated;

Comparisons: W =

DATE: 24 APR 98 Within Allowable Requirement; OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT

NSR =No Spec. Req. and/or 4 (x) Additive Concentration L. PERKINS A.F. AUT. W./MLSA: A.F. AUT. WL/POSF S. A. ANDERSON

IIM22 **MATERIAL / IDENTITY: NITRALLOY, 135 MODIFIED** TEST PLAN I.D. NO. TEST TEMPERATURE (°F) 325 ENGINE FUEL LINES & COMPONENTS **USE:**

EXPOSURE TIME (DAYS) 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

23 NOV 96 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST N	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	5		
MATERIAL			RES	ULTS					OVERAL	L
PROPERTY TESTS	JP	-8	JP-8	3 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L1	L	L1	L	L1	Localized Uniform Corrosion - All Samples	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	24.0570	24.0590	24.1775	24.1791	24.0172	24.0776				
GAIN / LOSS (gms)		+.0020		+.0016		+.0004		CN	W	W
MICROSCOPY EVAL.										

FUELS	Т			ERIAL EXIODS (28 D		E	P		CONTRO S. POST (STR	_	YS @ 325°	F)	SPEC. RANGE		ST RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	- 100 x4	FOR JP-8	OBS	SERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C4	С3	C4	С3	C4	С3	С	C1	С	C1	C	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	118	6	375	30	604	262	108	39	248	131	912	410	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Cr	12	26	1	3	2	8	NE		NE		NE			NE	NE	NE
Al	21	6	12	ND	22	10	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =Not Evaluated;

Comparisons: W =

Within Allowable Requirement; DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT NSR =

No Spec. Req. and/or 4 (x) Additive Concentration L. PERKINS A.F. AUT. W./MLSA: A.F. AUT. WL/POSF S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

II.M.23.1 MATERIAL / IDENTITY: LEADED BRONZE(TAP MS 285), SAW CUT TEST PLAN I.D. NO.

TEST TEMPERATURE (°F) **AMBIENT** ENGINE FUEL PUMP GEAR BEARING **USE: EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

10 MAY 95 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST N	MATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST	RESULTS	5		
MATERIAL			RES	ULTS					(OVERAL	L
PROPERTY TESTS	JP	-8	JP-	8 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCE	E S	EV	VALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST			JP8	+100	X4
COLOR	L	L1	L	L1	L	L1	Deposits / Discoloration All Samples		CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND			CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND			CN	W	W
AVG. WT. (gms)	14.7601	14.7604	14.7407	14.7407	14.7512	14.7515					
GAIN / LOSS (gms)		+.0003		.0000		+.0003	Selective Leaching Not Found		CN	W	W
MICROSCOPY EVAL.											
	Т	EST FUE	L / MAT	ERIAL E	XPOSUR	E	CONTROL FUEL	SPEC.	TES	ST RESU	LTS

FUELS	Т			ERIAL EX IODS (28 D		E	F		CONTRO S. POST (ST	_	AYS @ 70°I	?)	SPEC. RANGE		ST RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	- 100 x4	FOR JP-8	OBS	SERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	С	C	С	С	C	C	С	C1	С	C1	C	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	167	68	303	276	563	576	108	123	248	141	912	555	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Pb	<5	ND	50	ND	150	ND	NE		NE		NE			NE	NE	NE
Cu	280	50	330	50	490	50	NE		NE		NE			NE	NE	NE
Sn	25	ND	50	ND	50	ND	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =Not Evaluated;

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT NSR =

No Spec. Req. and/or 4 (x) Additive Concentration L. PERKINS A.F. AUT. W./MLSA: A.F. AUT. WL/POSF S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

MATERIAL / IDENTITY: LEADED BRONZE(TAP MS 285), SAW CUT TEST PLAN I.D. NO. II.M.23.1 TEST TEMPERATURE (°F) 200 ENGINE FUEL PUMP GEAR BEARING **USE:**

EXPOSURE TIME (DAYS) 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

10 MAY 95 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

TEST DATE STAKT:		IUMAI			J1 -0	DAGELLI	TIL FOLL		ODF 2700	0 1 (31 -0 1	iuuiii ves,				_	
		TEST N	MATERIAL	/ FUEL EXP	OSURE				EVA	LUAT	ION O	F TEST	RESULTS	;		
MATERIAL			RES	ULTS											OVERAL	L
PROPERTY TESTS	JP	·-8	JP-	8 +100	JP8+1	00 (X4)		OBSER	VATIO	NS ANI	REF	ERENC	E S	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST								JP8	+100	X4
COLOR	L	L2	L	L2	L	L2	Deposits /	Discoloration	All Samples					CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND				CN	W	W				
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P	Pitting All Samples							CN	W	W
AVG. WT. (gms)	14.7785	14.7785	14.6815	14.6817	14.7123	14.7124										
GAIN / LOSS (gms)		.0000		+.0002		+.0001	Selective I	Leaching Not	Found					CN	W	W
MICROSCOPY EVAL.																
FUELS	Т			ERIAL E		E	I	PRE (NEW) V	SPEC. RANGE		T RESU GENERA					
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	- 100 x4	FOR JP-8	OBS	SERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN /	JP8	+100	X4

FUELS		4 X 7	DAY PER	RIODS (28 D	(AYS)		F	RE (NEW) V	S. POST (STI	RESSED 7 DA	AYS @ 70°F	7)	RANGE	(GENERA!	L
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C1	C1	C2	C2	C1	С	C1	C	C1	С	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	147	59	300	216	569	522	108	123	248	141	912	555	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Pb	200	ND	100	ND	100	ND	NE		NE		NE			NE	NE	NE
Cu	67	15	105	75	140	75	NE		NE		NE			NE	NE	NE
Sn	50	ND	50	ND	50	ND	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

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Comparisons: W =

DATE: 24 APR 98 Within Allowable Requirement; OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

Not applicable;

N/A =CN = ControlUTC ENG: J. LEONE GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT

NSR =No Spec. Req. and/or 4 (x) Additive Concentration L. PERKINS A.F. AUT. W./MLSA: A.F. AUT. WL/POSF S. A. ANDERSON

MATERIAL / IDENTITY: LEADED BRONZE(TAP MS 285), SAW CUT TEST PLAN I.D. NO. II.M.23.1 TEST TEMPERATURE (°F) 325 ENGINE FUEL PUMP GEAR BEARING **USE:**

EXPOSURE TIME (DAYS) 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

7 SEP 94 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST N	ATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST	RESULTS	}		
MATERIAL			RES	ULTS					(OVERAL	L
PROPERTY TESTS	JP	'-8	JP-	8 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENC	E S	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST			JP8	+100	X4
COLOR	L	L3	L	L3	L	L3	Deposits / Discoloration All Samples		W	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND			W	W	W
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P	Pitting All Samples				
AVG. WT. (gms)	14.8183	14.8123	15.0083	15.0061	16.0856	16.0818					
GAIN / LOSS (gms)		0010		0022		0038			W	W	W
MICROSCOPY EVAL.											
		ECT FILE	T / N / A / D	EDIAL E	VDOCLID	To .	COMEDOT ETTEL	SPEC.	TERC	T DECL	T TC
FUELS	T	-		ERIAL E HODS (28 D		E	CONTROL FUEL PRE (NEW) VS. POST (STRESSED 7 DAYS @ 70°F)	RANGE		ST RESU GENERA	

FUELS	Т			ERIAL E		Œ	I		CONTRO 'S. POST (ST	-	AYS @ 70°F	")	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C5	C5	C4	C4	С3	С3	C	C1	C	C1	С	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	167	68	303	276	563	576	108	123	248	141	912	555	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Pb	2000	ND	7000	ND	10,000	ND	NE		NE		NE			NE	NE	NE
Cu	500	550	1800	800	3000	1200	NE		NE		NE			NE	NE	NE
Sn	ND	ND	ND	ND	ND	ND	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =Not Evaluated;

Comparisons:

W =DATE: 24 APR 98 Within Allowable Requirement; OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

Not applicable; N/A =CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT

NSR =No Spec. Req. and/or 4 (x) Additive Concentration L. PERKINS A.F. AUT. W./MLSA: A.F. AUT. WL/POSF S. A. ANDERSON

MATERIAL / IDENTITY: LEADED BRONZE(TAP MS 285), POLISHED CYLINDER, END DRYLUB TEST PLAN I.D. NO. II.M.23.2 TEST TEMPERATURE (°F) Ambient ENGINE FUEL PUMP GEAR BEARING **USE: EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980 10 MAY 95 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST N	MATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESUI	TS		
MATERIAL			RES	ULTS					OVERAL	L
PROPERTY TESTS	JP	P-8	JP-	8 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	E	VALUATI	ON
(AVG. 5 SPECIMENS)	PRE	L LI L LI L LI				POST		JP8	+100	X4
COLOR	L L1 L L1 L Minimum Deposits / Discoloration					L1	Minimum Deposits / Discoloration All Samples	CN	W	W
PITTING (VISUAL)	ND ND ND ND ND				ND	ND	Voids In Coating	CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	14.7601	14.7604	14.7407	14.7407	14.7512	14.7515				
GAIN / LOSS (gms)		+.0003		.0000		+.0003	Selective Leaching of Pb Not Present	CN	W	W
MICROSCOPY EVAL.										
	Т	EST FUE	L / MAT	ERIAL E	XPOSUR	E	CONTROL FUEL SPEC.	TE	ST RESU	LTS

		•		="		•										
FUELS	Т			ERIAL EX IODS (28 D		E	F		CONTRO 'S. POST (ST	_	AYS @ 70°I	?)	SPEC. RANGE		ST RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	- 100 x4	FOR JP-8	OBS	SERVATION	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C	C1	C	C1	C	C1	С	C	C	С	С	C		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	167	68	303	276	563	576	NE	NE	298	273	563	540	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Pb	<5	ND	50	ND	150	ND	NE		NE		NE			NE	NE	NE
Cu	280	50	330	50	490	50	NE		NE		NE			NE	NE	NE
Sn	25	ND	50	ND	50	ND	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =Not Evaluated;

Comparisons:

W = DATE: 24 APR 98 Within Allowable Requirement; OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

Not applicable; N/A =CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT

NSR =No Spec. Req. and/or 4 (x) Additive Concentration L. PERKINS A.F. AUT. W./MLSA: A.F. AUT. WL/POSF S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

MATERIAL / IDENTITY: LEADED BRONZE(TAP MS 285), POLISHED CYLINDER, END DRYLUB TEST PLAN I.D. NO. II.M.23.2 TEST TEMPERATURE (°F) 200 ENGINE FUEL PUMP GEAR BEARING **USE: EXPOSURE TIME (DAYS)** 28 TEST ADDITIVE/FUEL: Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980 10 MAY 95 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST N	MATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULT	TS.		
MATERIAL			RES	ULTS					OVERAL	L
PROPERTY TESTS	JP	'-8	JP-8	3 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	E	VALUATI	ON
(AVG. 5 SPECIMENS)	L LI L LI L L				PRE	POST		JP8	+100	X4
COLOR	L	L1	L	L1	L	L1	CN	W	W	
PITTING (VISUAL)	ND ND ND ND ND				ND	ND	Voids In Coating	CN	W	W
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P	Minimum Pitting	CN	W	W
AVG. WT. (gms)	14.7785	14.7785	14.6815	14.6817	14.7123	14.7124				
GAIN / LOSS (gms)		.0000		+.0002		+.0001	Selective Leaching Of Pb Not Present	CN	W	W
MICROSCOPY EVAL.										
	Т	EST FUE	L / MAT	ERIAL E	XPOSUR	E	CONTROL FUEL SPEC.	TES	ST RESU	LTS

FUELS	Т			ERIAL EX IODS (28 D		E	P		CONTRO S. POST (STE	_	YS @ 200°l	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C1	C1	C2	C2	C1	C	C	C	С	C	C		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	147	59	300	216	569	522	108	39	248	131	912	410	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Pb	200	ND	100	ND	100	ND	NE		NE		NE			NE	NE	NE
Cu	67	15	105	75	140	75	NE		NE		NE			NE	NE	NE
Sn	50	ND	50	ND	50	ND	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L =L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =Not Evaluated;

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

Not applicable; N/A =CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT

NSR =No Spec. Req. and/or 4 (x) Additive Concentration L. PERKINS A.F. AUT. W./MLSA: A.F. AUT. WL/POSF S. A. ANDERSON

MATERIAL / IDENTITY: LEADED BRONZE (TAP MS 285), Cu, POLISHED EXCEPT D.F. END TEST PLAN I.D. NO. II.M.23.2 TEST TEMPERATURE (°F) 325 ENGINE FUEL PUMP GEAR BEARING **USE: EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980 26 MAR 96 93 POSF 2980 + (JP-8 Additives) TEST DATE START: JP-8 BASELINE FUEL:

		TEST N	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	3		
MATERIAL				ULTS				•	OVERAL	L
PROPERTY TESTS	JP	-8	JP-8	8 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L2	L	L2	L	L2	Discoloration / Deposits All Samples	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND	Voids in Coating	CN	W	W
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P	Pitting All Samples	CN	W	W
AVG. WT. (gms)	14.7343	14.7347	14.7221	14.7216	14.8250	14.8246				
GAIN / LOSS (gms)		+.0004		0005		0004	Selective Leaching Of Pb Not Present	CN	W	W
MICROSCOPY EVAL.										

FUELS	Т			ERIAL EX IODS (28 D		E	P		CONTRO S. POST (STR	_	YS @ 325°	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C2	C2	C2	C2	C2	С	С	C	С	С	С		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	105	9	442	35	751	334	108	39	248	131	912	410	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Pb	127	NE	130	NE	145	NE	NE		NE		NE			NE	NE	NE
Cu	565	NE	540	NE	620	NE	NE		NE		NE			NE	NE	NE
Sn	47	NE	53	NE	45	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =

Comparisons:

W =DATE: 24 APR 98 Within Allowable Requirement; OT = Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

Not applicable; N/A =CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT

NSR =No Spec. Req. and/or 4 (x) Additive Concentration L. PERKINS A.F. AUT. W./MLSA: A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. II.M.23.3 MATERIAL / IDENTITY: LEADED BRONZE (TAP MS 285), Cu , INDIUM CLY., D.F. END

TEST TEMPERATURE (°F) 325 USE: EXPOSURE TIME (DAYS) 28 TEST ADDITIVE/FUEL: Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

TEST DATE START: 7 FEB 96 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

TEST DATE START:		/ FEB 90	<u>) </u>		JP-8	BASELI	INE FUEL	4: <u>93</u>	PUSE 298	U + (JP-8 <i>E</i>	Additives					
		TEST N	MATERIAL	/ FUEL EXP	OSURE				EVA	LUAT	ION O	F TEST	RESULTS	3		
MATERIAL			RES	ULTS										,	OVERAL	L
PROPERTY TESTS	JP	-8	JP-8	3 +100	JP8+1	00 (X4)		OBSER	VATIO	NS ANI	REF	ERENC	ES	EV	VALUATI	(ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST								JP8	+100	X4
COLOR	L	L2	L	L2	L	L2	Discolorat	tion / Deposits	All Samples					CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND	Voids in C	oating		CN	W	W				
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P	Pitting All	Samples		CN	W	W				
AVG. WT. (gms)	14.7580	14.7577	14.7032	14.7026	14.7333	14.7328										
GAIN / LOSS (gms)		0003		0006		0005	Selective I	eaching Of P	b Not Present					CN	W	W
MICROSCOPY EVAL.																
	Т	EST FUE	L / MAT	ERIAL E	XPOSUR	E			CONTRO	L FUEL			SPEC.	TES	ST RESU	JLTS
FUELS		4 X 7	DAY PER	IODS (28 D	AYS)		P	PRE (NEW) V	RANGE	(GENERA	.L				
PROPERTY TESTS*							J	P-8	JP-8	+ 100	JP-8 +	- 100 x4	FOR JP-8	OBS	SERVATI	IONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN /	JP8	+100	X4
		1								1			MAY			1

FUELS	Т	-		ERIAL EX TODS (28 D		E	P		CONTRO S. POST (STR	_	YS @ 325°I	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JF	- -8	JP-8	+ 100	JP-8 +	- 100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	С3	С3	С3	С3	С3	С3	С	C2	C	C2	C	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	100	5	479	85	815	379	108	123	248	141	912	555	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Cu	77	170	170	109	150	210	NE		NE		NE			NE	NE	NE
Pb	50	ND	400	200	980	200	NE		NE		NE			NE	NE	NE
Sn	90	ND	90	ND	92	ND	NE		NE		NE			NE	NE	NE
In	78	3	664	33	980	50	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L = Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W = Within Allowable Requirement; DATE: 24 APR 98

OT = Material Tested Beyond Temperature Range O = Outside Allowable Requirement UDRI TECH: A. BEHME
N/A = Not applicable; CN = Control UTC ENG: J. LEONE

NSR = No Spec. Req. and/or 4 (x) Additive Concentration

A.F. AUT. W./MLSA:

L. PERKINS

A.F. AUT. WL/POSF

S. A. ANDERSON

MATERIAL / IDENTITY: LEADED BRONZE(TAP MS285), INDIUM CTD EXCEPT D.F. LUBE END TEST PLAN I.D. NO. II.M.23.4 TEST TEMPERATURE (°F) 325 ENGINE FUEL PUMP GEAR BEARING **USE: EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980 21 FEB 96 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		11231 W	IAIEKIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	8		
MATERIAL			RESU	ULTS				(OVERAL	L
PROPERTY TESTS	JP-S	8	JP-8	+100	JP8+10	00 (X4)	OBSERVATIONS AND REFERENCES	EV	VALUATION	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L1	L	L1	L	L1	Discoloration / Deposits All Samples	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND	Voids in Coating	CN	W	W
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P	Pitting All Samples	CN	W	W
AVG. WT. (gms)	14.7488	14.7485	14.7394	14.7388	14.6863	14.6859				
GAIN / LOSS (gms)		0003		0006		0004	Selective Leaching Of Pb Not Present	CN	W	W
MICROSCOPY EVAL.										

	-	=	='	=		=										
FUELS	Т			ERIAL EXIODS (28 D		E	P		CONTRO S. POST (STR	_	YS @ 325°	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	- 100 x4	FOR JP-8	OBS	SERVATIO	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	С3	С3	С3	С3	С3	С3	С	C2	С	C2	С	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	89	19	438	60	753	325	108	123	248	141	912	555	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Cu	15	NE	42	NE	77	NE	NE		NE		NE			NE	NE	NE
Pb	150	NE	500	NE	400	NE	NE		NE		NE			NE	NE	NE
Sn	ND	NE	ND	NE	ND	NE	NE		NE		NE			NE	NE	NE
In	20	NE	650	NE	895	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =Not Evaluated;

Comparisons: W =

DATE: 24 APR 98 Within Allowable Requirement; OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

Not applicable; N/A =CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT

NSR =No Spec. Req. and/or 4 (x) Additive Concentration L. PERKINS A.F. AUT. W./MLSA: A.F. AUT. WL/POSF S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

II.M.23.4 LEADED BRONZE(TAP MS285), INDIUM CTD EXCEPT D.F. LUBE END TEST PLAN I.D. NO. MATERIAL / IDENTITY: TEST TEMPERATURE (°F) 400 **USE:** ENGINE FUEL PUMP GEAR BEARING **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8O462 (Normal and x4 Concentrations) /93 POSF 2980

03 POSE 2080 ± (IP-8 Additives) TEST DATE START. 20 FER 96 JP-8 BASELINE FUEL:

TEST DATE START:		20 FEB 9	<u> </u>		Jr-o	DASELI	NE FUEL	: 931	PUSF 2980) + (JP-0 A	<u>(autuves)</u>					
		TEST N	IATERIAL	/ FUEL EXP	OSURE				EVA	LUATI	ON O	F TEST	RESULTS	3		
MATERIAL			RESU	ULTS										(OVERAL	L
PROPERTY TESTS	JP	-8	JP-8	3 +100	JP8+10	00 (X4)		OBSER	VATIO	NS ANL	REFI	ERENC	ES	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST								JP8	+100	X4
COLOR	L	L2	L	L2	L	L2	Discolorati	on / Deposits		CN	W	W				
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND	VD Voids in Coating								W	W
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P	<u> </u>								W	W
AVG. WT. (gms)	14.7281	14.7280	14.8062	14.8055	14.6750	14.6742										
GAIN / LOSS (gms)		0001		0007		0008	Selective L	eaching Of Pl	Not Present					CN	W	W
MICROSCOPY EVAL.																
FUELS	Т	-		ERIAL E		E	P		CONTRO		YS @ 400°1	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4

CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	101	3	445	10	771	242	108	5	248	5	912	428	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Cu	40	NE	580	NE	560	NE	NE		NE		NE			NE	NE	NE
Pb	500	NE	1000	NE	3000	NE	NE		NE		NE			NE	NE	NE
Sn	ND	NE	ND	NE	ND	NE	NE		NE		NE			NE	NE	NE
In	105	NE	860	NE	1400	NE	NE		NE		NE			NE	NE	NE

COLOR (7 DAYS)

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: C = Clear C1 - C6 = Light to Dark

P = Pitting**Designations:** NE =Not Evaluated; ND = Not Detected; BD = Below Detection

Comparisons:

W = DATE: Within Allowable Requirement; OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT

NSR =No Spec. Req. and/or 4 (x) Additive Concentration L. PERKINS A.F. AUT. W./MLSA: A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. II.M.24 /I.M.20 MATERIAL / IDENTITY: 17-4 pH STAINLESS STEEL
TEST TEMPERATURE (°F) 325 USE: ENGINE FUEL LINES & COMPONENTS

EXPOSURE TIME (DAYS) 28 TEST ADDITIVE/FUEL: Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

TEST DATE START: 23 NOV 94 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST N	MATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST	RESULTS	5		
MATERIAL			RES	ULTS						OVERAL	L
PROPERTY TESTS	JI	·-8	JP-8	3 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENC	ES	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST			JP8	+100	X4
COLOR	L	L2	L	L1	L	L			CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND	Surface Deposits - JP-8 and +100 Samples		CN	W	W
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P	Minimum Pitting - All Samples		CN	W	W
AVG. WT. (gms)	15.9746	15.9753	15.5620	15.5621	15.7797	15.7796					1
GAIN / LOSS (gms)		+.0007		+.0001		0001			CN	W	W
MICROSCOPY EVAL.					_						
	Т	EST FUE	L / MAT	ERIAL E	XPOSUR	E	CONTROL FUEL	SPEC.	TES	T RESU	LTS
FUELS		4 X 7	DAY PER	IODS (28 E	DAYS)		PRE (NEW) VS. POST (STRESSED 7 DAYS @ 325°F)	RANGE	(GENERA	L
PROPERTY TESTS*							JP-8 JP-8 + 100 JP-8 + 100 x4	FOR JP-8	OBS	SERVATI	ONS

FUELS	Т	-		ERIAL EX LIODS (28 D		Œ	P		CONTRO S. POST (STR	_	YS @ 325°I	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JP	- -8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28 7 28 7 28 2 C2 C2 C2 C2 C2					PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C2	C2	C2	C2	C2	C	C2	C	C2	C	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	37	5	227	15	648	250	50	4	300	57	569	241	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L = Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W = Within Allowable Requirement; DATE: __24 APR 98 _____
OT = Material Tested Beyond Temperature Range O = Outside Allowable Requirement UDRI TECH: __A.BEHME

N/A = Not applicable; CN = Control UTC ENG:

GT = Greater than 500 ppb LT = Less than 500 ppb UDRI P.I. ENG: D.H. KALT

NSR = No Spec. Req. and/or 4 (x) Additive Concentration

LT = Less than 500 ppb
UDRI P.I. ENG: D.H. KALT

A.F. AUT. W./MLSA: L. PERKINS

J. LEONE

A.F. AUT. WL/POSF

S.A. ANDERSON

^{*} Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. MATERIAL / IDENTITY: IN 200, NICKEL II.M.25 TEST TEMPERATURE (°F) 200 **ENGINE FUEL LINES & COMPONENTS** USE:

EXPOSURE TIME (DAYS) 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

TEST DATE START: 2 MAR 95 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST N	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	8		
MATERIAL PROPERTY TESTS	JP	-8		ULTS 8 +100	.IP8+1	00 (X4)	OBSERVATIONS AND REFERENCES		OVERAL VALUATI	
	PRE	POST	PRE	POST	PRE	POST	OBSERVATIONS AND REFERENCES	JP8	+100	X4
(AVG. 5 SPECIMENS)	TRE	FUS1	rke	FUS1	TRE		T I I I I I I I I I I I I I I I I I I I			
COLOR	L	LI	L	LI	L	L1	Localized Discoloration / Deposits All Samples	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	18.4290	18.4292	18.4988	18.4992	18.3699	18.3702		G3.		
GAIN / LOSS (gms)		+.0002		+.0004		+.0004		CN	W	W
MICROSCOPY EVAL.										

		-	~	•		~	-						·			
FUELS	Т			ERIAL EXIODS (28 D		E	P		CONTRO S. POST (STE	_	YS @ 200°	F)	SPEC. RANGE		ST RESU GENERA	
PROPERTY TESTS*							JF	P-8	JP-8	+ 100	JP-8 +	- 100 x4	FOR JP-8	OBS	SERVATIO	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C2	C1	C1	C1	C1	С	C1	С	C1	C	C1		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	164	54	280	251	649	471	108	39	248	131	912	410	150/600	0	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Cr	<10	<10	<10	<10	<10	<10	NE		NE		NE			NE	NE	NE
Ni	<10	<10	<10	<10	<10	<10	NE		NE		NE			NE	NE	NE
Fe	40	60	50	140	18	300	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

DATE:

Comparisons: W =Within Allowable Requirement;

OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME N/A =Not applicable; CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb**UDRI P.I. ENG:** D.H. KALT No Spec. Req. and/or 4 (x) Additive Concentration L. PERKINS

24 APR 98

NSR =A.F. AUT. W./MLSA: A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. MATERIAL / IDENTITY: IN 200, NICKEL II.M.25 TEST TEMPERATURE (°F) 325 **ENGINE FUEL LINES & COMPONENTS** USE: **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

TEST DATE START: 3 MAR 95 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST N	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	5		
MATERIAL PROPERTY TESTS	JP	-8		ULTS 8 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES		OVERAL!	
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST	ODSBRYMITONO MAD RELIGIOUS	JP8	+100	X4
COLOR	L	L2	L	L2	L	L1	Discoloration JP-8 and +100 Samples	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	18.3401	18.3436	18.4225	18.4246	18.5897	18.5908				
GAIN / LOSS (gms)		+.0035		+.0021		+.0011		CN	W	W
MICROSCOPY EVAL.										

FUELS	Т			ERIAL EX IODS (28 D		E	P		CONTRO S. POST (STR	_	YS @ 325°	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JF	'-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	С3	С3	С3	С3	С3	С3	С	C2	С	C2	С	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	164	13	257	43	558	194	108	123	248	141	912	555	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Cr	10	5	10	5	60	5	NE		NE		NE			NE	NE	NE
Ni	10	390	10	580	140	940	NE		NE		NE			NE	NE	NE
Fe	10	40	10	40	300	185	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb**UDRI P.I. ENG:** D.H. KALT No Spec. Req. and/or 4 (x) Additive Concentration NSR =A.F. AUT. W./MLSA: L. PERKINS

A.F. AUT. WL/POSF S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. II.M.26 MATERIAL / IDENTITY: STAINLESS STEEL, BRAZED NOZZLES TEST TEMPERATURE (°F) 325 **ENGINE**, AUGMENTER SPRAY BAR USE: **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** 13 FEB 97 JP-8 BASELINE FUEL:

		TEST M	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	5		
MATERIAL			RES	ULTS				(OVERAL	Ĺ
PROPERTY TESTS	JP	-8	JP-8	8 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L1	L	L1	L	L1		CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	5.6728	5.6729	6.1740	6.1736	6.9078	6.9074				l
GAIN / LOSS (gms)		+.0001		0004		0004		CN	W	W
MICROSCOPY EVAL.										l

FUELS	Т			ERIAL EX IODS (28 D		E	P		CONTRO S. POST (STR	-	YS @ 325°I	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JP	·-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	SERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	С3	С3	С3	C4	С3	C4	С	C2	С	C2	C	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	29	10	221	47	609	285	50	4	300	57	569	241	150/600	0	0	0
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Ni	NE	40	NE	60	NE	60	NE		NE		NE			NE	NE	NE
Cr	NE	<5	NE	<5	NE	<5	NE		NE		NE			NE	NE	NE
Мо	NE	<20	NE	<20	NE	<20	NE		NE		NE			NE	NE	NE
Ti	NE	<5	NE	<5	NE	<5	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L = Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W = Within Allowable Requirement;

OT = Material Tested Beyond Temperature Range O = Outside Al

N/A = Not applicable; GT = Greater than 500 ppb

NSR = No Spec. Req. and/or 4(x) Additive Concentration

O = Outside Allowable Requirement
CN = Control
LT = Less than 500 ppb

DATE:
UDRI TECH:
UTC ENG:
UDRI P.I ENG:

 UTC ENG:
 J. LEONE

 UDRI P.I ENG:
 D.H. KALT

 A.F. AUT. W./MLSA:
 L. PERKINS

 A.F. AUT. WL/POSF
 S. A. ANDERSON

24 APR 98

A. BEHME

^{*} Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. MATERIAL / IDENTITY: MONEL 400, NICKEL & COPPER II.M.27 /I.M.34 TEST TEMPERATURE (°F) 325 AIRFRAME / ENGINE FUEL SYSTEM USE: **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980 **TEST DATE START:** 6 DEC 95 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST N	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	6		
MATERIAL			RESU	ULTS					OVERAL	L
PROPERTY TESTS	JP						OBSERVATIONS AND REFERENCES	E	VALUATI	ON_
(AVG. 5 SPECIMENS)	PRE					POST		JP8	+100	X4
COLOR	L	L1	L	L1	L	L1	Discoloration / Localized Uniform Corrosion All Samples	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	15.8205	15.8175	15.7782	15.7762	15.6879	15.6849				
GAIN / LOSS (gms)		0030		0020		0030		CN	W	W
MICROSCOPY EVAL.				•						

FUELS	Т	-		ERIAL EX IODS (28 D		E	P		CONTRO S. POST (STR	-	YS @ 325°	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	7 28 7 28 7 28 C4 C5 C4 C5 C4 C5						POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C4	C5	C4	C5	C4	C5	С	C2	С	C2	C	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	235	162	500	210	757	482	108	123	248	141	912	555	150/600	W	W	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Ni	160	360	270	610	830	840	NE		NE		NE			NE	NE	NE
Cu	790	1310	850	1070	1060	1900	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE GT =Greater than 500 ppb LT = Less than 500 ppb**UDRI P.I. ENG:**

D.H. KALT No Spec. Req. and/or 4 (x) Additive Concentration NSR =A.F. AUT. W./MLSA: L. PERKINS

A.F. AUT. WL/POSF S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. II.M.28 MATERIAL / IDENTITY: **INCOLOY 909** TEST TEMPERATURE (°F) 325 USE: **ENGINE FUEL LINES & COMPONENTS** 28 Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL:** 17 OCT 96 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST M	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	5		
MATERIAL			RES	ULTS				(OVERAL	L
PROPERTY TESTS	JP						OBSERVATIONS AND REFERENCES	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	02 0 12 0 12 0 12 0 12 0 12 0 12 0 12 0				POST		JP8	+100	X4
COLOR	L	L1	L	L1	L	L1	Discoloration / Deposits - All Samples	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	11.2295	11.2294	11.7097	11.7096	11.6281	11.6278				
GAIN / LOSS (gms)		0001		0001		0003		CN	W	W
MICROSCOPY EVAL.										

FUELS	Т			ERIAL E		Œ	P		CONTRO S. POST (STR	_	YS @ 325°1	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	SERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	С6	C6	С6	С6	C6	C6	С	C2	C	C2	С	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	205	94	513	75	890	178	108	123	248	141	912	555	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Fe	10	NE	90	NE	200	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: C1 - C6 = Light to Dark $\mathbf{C} =$ Clear

Designations: NE =Not Evaluated; $ND = Not \ Detected; \quad BD = Below \ Detection$ P = Pitting

Comparisons: W =

Within Allowable Requirement; OT =Material Tested Beyond Temperature Range

N/A =Not applicable; CN = ControlGreater than 500 ppb GT =

NSR = No Spec. Req. and/or 4 (x) Additive Concentration

DATE: 24 APR 98 O = Outside Allowable Requirement UDRI TECH: __A. BEHME UTC ENG: J. LEONE LT = Less than 500 ppb**UDRI P.I. ENG:** D.H. KALT A.F. AUT. W./MLSA: L. PERKINS S. A. ANDERSON A.F. AUT. WL/POSF

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists **Between Material Degradation and Fuel Properties Degradation**

TEST PLAN I.D. NO. II.M.29 MATERIAL / IDENTITY: Ti 6-2-4-2, TITANIUM, AMS 4919C TEST TEMPERATURE (°F) 325 USE: **ENGINE FUEL LINES & COMPONENTS** 28 Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL:** 6 DEC 95 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST N	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	3		
MATERIAL	ΙĐ	_Q		ULTS	IP8±1	00 (\$4)	OBSERVATIONS AND REFERENCES		OVERAL	
PROPERTY TESTS		JP-8 JP-8 +100 JP8+100 (X4) E POST PRE POST PRE POST PRE POST					OBSERVATIONS AND REFERENCES		ALUATI	
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L	L	L	L	L	Minimum Discoloration All Samples	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	9.2102	9.2100	9.1022	9.1022	8.9269	8.9266				
GAIN / LOSS (gms)		0002		.0000		0003		CN	W	W
MICROSCOPY EVAL.										

FUELS	T			ERIAL EX IODS (28 D		E	P	RE (NEW) VS	CONTRO S. POST (STR	_	YS @ 325°	F)	SPEC. RANGE		ST RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	SERVATI	ONS
	7	7 28 7 28 7 28 C3 C4 C3 C5 C3 C4						POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	С3	C4	С3	C5	C3	C4	C	C2	C	C2	C	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	239	121	543	112	757	367	108	123	248	141	912	555	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY					L					
Fe	ND	20	ND	30	1	17	NE		NE		NE			NE	NE	NE
	ND	30	12	44	16	35	NE		NE		NE			NE	NE	NE
	ND	ND	ND	ND	ND	ND	NE		NE		NE			NE	NE	NE
	ND	ND	ND	ND	ND	ND	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; $ND = Not \ Detected; \quad BD = Below \ Detection$ P = Pitting

Comparisons: W =Within Allowable Requirement;

OT =Material Tested Beyond Temperature Range

N/A =Not applicable; Greater than 500 ppb GT =

NSR = No Spec. Req. and/or 4 (x) Additive Concentration O = Outside Allowable Requirement

CN = Control

LT = Less than 500 ppb

DATE: UDRI TECH:

UTC ENG: **UDRI P.I. ENG:** A.F. AUT. W./MLSA: A.F. AUT. WL/POSF

24 APR 98 __A. BEHME J. LEONE D.H. KALT L. PERKINS S. A. ANDERSON

TEST PLAN I.D. NO. II.M.30 MATERIAL / IDENTITY: HAYNES 188 (Co, Cr, Ni) TEST TEMPERATURE (°F) 325 **ENGINE FUEL LINES & COMPONENTS** USE: **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** 6 DEC 95 JP-8 BASELINE FUEL:

		TEST N	MATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	,		
MATERIAL			RES	ULTS				(OVERAL	L
PROPERTY TESTS	JP	-8	JP-8	8 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L1	L	L1	L	L1	Discoloration - JP-8 & +100 Samples	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	13.8204	13.8201	13.8170	13.8169	13.8115	13.810				
GAIN / LOSS (gms)		0003		0001		0005		CN	W	W
MICROSCOPY EVAL.										

FUELS	Т			ERIAL EX IODS (28 D		E	P		CONTRO S. POST (STR	_	YS @ 325°	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JF	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28 7 28 7 28 3 C4 C3 C4 C3 C4						POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	С3	C4	С3	C4	С3	C4	С	C2	С	C2	C	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	240	126	496	117	758	314	108	123	248	141	912	555	150/600	0	0	W
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Со	12	ND	18	5	27	18	NE		NE		NE			NE	NE	NE
Cr	1	2	3	7	10	66	NE		NE		NE			NE	NE	NE
Ni	ND	ND	3	4	9	26	NE		NE		NE			NE	NE	NE
W	ND	ND	ND	ND	ND	ND	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE GT =

Greater than 500 ppb LT = Less than 500 ppb**UDRI P.I. ENG:** D.H. KALT NSR =No Spec. Req. and/or 4 (x) Additive Concentration A.F. AUT. W./MLSA: L. PERKINS

A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. II.M.31 MATERIAL / IDENTITY: HAYNES 214 (Co, Cr, Ni) TEST TEMPERATURE (°F) 325 **ENGINE FUEL LINES & COMPONENTS** USE: **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980 NTP 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST M	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	;		
MATERIAL			RES	ULTS				(OVERAL	L
PROPERTY TESTS	JP	2-8	JP-	8 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	NE	NE	NE	NE	NE	NE		NE	NT	NT
PITTING (VISUAL)	NE	NE	NE	NE	NE	NE		NE	NT	NT
PITTING (MICROSCOPY)	NE	NE	NE	NE	NE	NE		NE	NT	NT
AVG. WT. (gms)	NE	NE	NE	NE	NE	NE		NE	NT	NT
GAIN / LOSS (gms)		NE		NE		NE		NE	NT	NT
MICROSCOPY EVAL.	NE	NE	NE	NE	NE	NE		NE	NT	NT

FUELS	Т			ERIAL EX IODS (28 D		E	P		CONTRO S. POST (STR		YS @ 325°l	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JF	'-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28 7 28 7 28					PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE		NE	NE	NE
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	150/600	NE	NE	NE
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement;

DATE: OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:**

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE GT =Greater than 500 ppb LT = Less than 500 ppb**UDRI P.I. ENG:** D.H. KALT

NSR =No Spec. Req. and/or 4 (x) Additive Concentration

A.F. AUT. W./MLSA: L. PERKINS A.F. AUT. WL/POSF S. A. ANDERSON

24 APR 98

A. BEHME

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. II.M.32.1 MET 162(AS CAST ALLOY 310) AMS 7902 BERYLLIUM ALLOY MATERIAL / IDENTITY: TEST TEMPERATURE (°F) 325 **ENGINE FUEL SYSTEM** USE: **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980 **TEST DATE START:** 27 AUG 96 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

		TEST N	MATERIAL	/ FUEL EXP	OSURE			EVALUATI	ON OF TEST	RESULTS	5		
MATERIAL			RES	ULTS							(OVERAL	L
PROPERTY TESTS	JF	2-8	JP-8	3 +100	JP8+1	00 (X4)	OBSERV	ATIONS AND	REFERENC	ES	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST					JP8	+100	X4
COLOR	L	L2	L	L2	L	L2	Samples Soaked in Water		CN	W	W		
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND	45 Minute Power Outage		CN	W	W		
PITTING (MICROSCOPY)	ND	P	ND	P	ND	P			CN	W	W		
AVG. WT. (gms)	7.9519	7.9545	7.5858	7.5368	7.5331	7.5899	Localized Surface Deposits	s All Samples					
GAIN / LOSS (gms)		+.0026		0490		+.0568	Minimum Pitting All Samp	ples			CN	W	W
MICROSCOPY EVAL.													
	Т	EST FUE	L / MAT	ERIAL E	XPOSUR	E	C	ONTROL FUEL	· ·	SPEC.	TES	T RESU	LTS
FUELS		4 X 7	DAY PER	IODS (28 D	AYS)		PRE (NEW) VS. I	POST (STRESSED 7 DA	YS @ 325°F)	RANGE		GENERA	L
PROPERTY TESTS*							JP-8	JP-8 + 100	JP-8 + 100 x4	FOR JP-8	OBS	ERVATI	
1	7	26	7	26	7	28	DDE DOCE	DDE DOCE	DDE DOCE	BATEL /	TDQ	1100	V/

	1	-		CKIAL C		æ	_		CONTRU	-	****	-	SI EC.		I KESU	
FUELS		4 X 7	DAY PER	RIODS (28 D	OAYS)		P	RE (NEW) V	S. POST (STE	RESSED 7 DA	YS @ 325°.	F)	RANGE	•	GENERA	L
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	- 100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C6	C6	C6	C6	C6	C6	С	C2	C	C2	C	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	184	78	536	71	949	89	108	123	248	141	912	555	150/600	0	0	0
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = Control

UTC ENG: J. LEONE GT =Greater than 500 ppb LT = Less than 500 ppb**UDRI P.I. ENG:** D.H. KALT A.F. AUT. W./MLSA: L. PERKINS

No Spec. Req. and/or 4 (x) Additive Concentration NSR =

A.F. AUT. WL/POSF S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. II.M.32.2 MATERIAL / IDENTITY: MET 162 (MACH. SURFACES 157), AMS 7902 BERYLLIUM ALLOY TEST TEMPERATURE (°F) 325 USE: **ENGINE FUEL SYSTEM** 28 Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL:** 27 AUG 96 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST N	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	5		
MATERIAL			RES	ULTS				1	OVERALI	L
PROPERTY TESTS	JP	'-8	JP-	8 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L2	L	L2	L	L2	Samples Soaked in Water - 24 Sep 96 - 9 Oct 96	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND	45 Minute Power Outage	CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	6.2444	6.2442	6.0792	6.0829	6.4465	6.4460	Surface Depoits All Samples			
GAIN / LOSS (gms)		0002		+.0037		0005		CN	W	W
MICROSCOPY EVAL.										

FUELS	Т	-		ERIAL E		E	P		CONTRO S. POST (STR	_	YS @ 325°	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	- 100 x4	FOR JP-8	OBS	SERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	С6	С6	С6	С6	C6	С6	С	C2	С	C2	С	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	175	88	533	92	928	74	108	123	248	141	912	555	150/600	0	0	0
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; $ND = Not \ Detected; \quad BD = Below \ Detection$ P = Pitting

Comparisons: W =Within Allowable Requirement;

OT =Material Tested Beyond Temperature Range

N/A =Not applicable; Greater than 500 ppb GT =

NSR = No Spec. Req. and/or 4 (x) Additive Concentration O = Outside Allowable Requirement

CN = Control

LT = Less than 500 ppb

DATE: UDRI TECH: UTC ENG: **UDRI P.I. ENG:** A.F. AUT. W./MLSA:

A.F. AUT. WL/POSF

24 APR 98 __A. BEHME J. LEONE D.H. KALT L. PERKINS S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists **Between Material Degradation and Fuel Properties Degradation**

TEST PLAN I.D. NO. II.M.32.3 MATERIAL / IDENTITY: Met (AM162, ROLLED STD. GRIND FINISH), AMS 7902B TEST TEMPERATURE (°F) 325 USE: **ENGINE FUEL SYSTEM** 28 Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL:** 27 AUG 96 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST M	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	S		
MATERIAL			RES	ULTS				•	OVERAL	L
PROPERTY TESTS	JP	2-8	JP-8	3 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L1	L	L1	L	L1	Surface Deposits All Samples	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	4.6667	4.6662	4.4884	4.4886	4.7171	4.7173				
GAIN / LOSS (gms)		0005		+.0002		+.0002		CN	W	W
MICROSCOPY EVAL.										

FUELS	Т			ERIAL EX IODS (28 D		E	P.		CONTRO S. POST (STR		YS @ 325°I	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	С6	C6	С6	C6	C5	С6	С	C2	С	C2	С	C2		0	0	О
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	193	76	562	80	945	93	108	123	248	141	912	555	150/600	0	W	0
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Al																
Be																

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; $ND = Not \ Detected; \quad BD = Below \ Detection$ P = Pitting

Comparisons: W =Within Allowable Requirement;

OT =Material Tested Beyond Temperature Range N/A =Not applicable;

Greater than 500 ppb GT =

NSR = No Spec. Req. and/or 4 (x) Additive Concentration O = Outside Allowable Requirement

LT = Less than 500 ppb

CN = Control

DATE: UDRI TECH: UTC ENG: **UDRI P.I. ENG:**

A.F. AUT. W./MLSA:

A.F. AUT. WL/POSF

__<u>A. BEHME</u> J. LEONE D.H. KALT L. PERKINS S. A. ANDERSON

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Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists **Between Material Degradation and Fuel Properties Degradation**

TEST PLAN I.D. NO. II.M.33 MATERIAL / IDENTITY: UNS C17200 Be Cu SPRING TEST TEMPERATURE (°F) 325 **ENGINE FUEL LINES & COMPONENTS** USE:

EXPOSURE TIME (DAYS) 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /93 POSF 2980

17 OCT 96 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST N	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	3		
MATERIAL			RES	ULTS				(OVERAL	L
PROPERTY TESTS	JP	-8	JP-8	3 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L3	L	L2	L	L2	Severe Discoloration - One Side of Sample Only - All samples	CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	13.8718	13.8701	14.6320	14.6303	14.2309	14.2293				
GAIN / LOSS (gms)		0017		0017		0016		CN	W	W
MICROSCOPY EVAL.										

		•	="	•		•										
FUELS	Т			ERIAL EXIODS (28 D		E	P		CONTRO S. POST (STE	_	YS @ 325°	F)	SPEC. RANGE		ST RESU GENERA	
PROPERTY TESTS*							JF	P-8	JP-8	+ 100	JP-8 +	- 100 x4	FOR JP-8	OBS	SERVATIO	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C6	C6	C5	C6	C5	C6	С	C2	С	C2	C	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	211	148	509	168	901	293	108	123	248	141	912	555	150/600	0	0	0
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
Cu	160	NE	630	NE	650	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE GT =Greater than 500 ppb LT = Less than 500 ppb**UDRI P.I. ENG:** D.H. KALT

No Spec. Req. and/or 4 (x) Additive Concentration NSR =A.F. AUT. W./MLSA: L. PERKINS

A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. IIM34 MATERIAL / IDENTITY: **INCO 718 DIFFUSION BONDED** TEST TEMPERATURE (°F) 325 **ENGINE FUEL LINES & COMPONENTS** USE: **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /92 POSF 2926 92 POSF 2926 + (JP-8 Additives) **TEST DATE START:** 13 FEB 97 JP-8 BASELINE FUEL:

		TEST M	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	5		
MATERIAL			RES	ULTS				(OVERAL	L
PROPERTY TESTS	JP						OBSERVATIONS AND REFERENCES	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L1	L	L1	L	L1		CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	2.0604	2.0604	1.4073	1.4073	1.7095	1.7095				
GAIN / LOSS (gms)		.0000		.0000		.0000		CN	W	W
MICROSCOPY EVAL.										

FUELS	Т			ERIAL EX IODS (28 D		E	P		CONTRO S. POST (STR	_	YS @ 325°I	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JF	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C2	С3	C2	C2	С3	С	C2	С	C2	C	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	233	15	406	42	661	361	50	4	300	57	569	241	150/600	0	0	0
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons:

W =Within Allowable Requirement; DATE: OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:**

A. BEHME N/A =Not applicable; CN = ControlUTC ENG:

J. LEONE GT =Greater than 500 ppb LT = Less than 500 ppb**UDRI P.I. ENG:** D.H. KALT NSR =No Spec. Req. and/or 4 (x) Additive Concentration A.F. AUT. W./MLSA: L. PERKINS

24 APR 98

A.F. AUT. WL/POSF S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. **IIM35** MATERIAL / IDENTITY: Si C REINFORCED Ti MMC TEST TEMPERATURE (°F) 325 **ENGINE FUEL LINES & COMPONENTS** USE: **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /92 POSF 2926 92 POSF 2926 + (JP-8 Additives) **TEST DATE START:** 13 FEB 97 JP-8 BASELINE FUEL:

		TEST N	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS)		
MATERIAL			RES	ULTS				(OVERAL	L
PROPERTY TESTS	JP	-8	JP-	3 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	PRE	02 0 1 2 0 1 2 0 1 2 0 1 2 1 1 1 1 1 1 1						JP8	+100	X4
COLOR	L	L1	L	L1	L	L1		CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	5.9608	5.9608	7.8863	7.8863	5.9709	5.9707				
GAIN / LOSS (gms)		.0000		.0000		0002		CN	W	W
MICROSCOPY EVAL.										

FUELS	Т			ERIAL EX IODS (28 D		E	P		CONTRO S. POST (STR	_	YS @ 325°l	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JF	·-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C2	C5	C4	С3	С3	С	C2	С	C2	C	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	233	41	408	90	660	432	50	4	300	57	569	241	150/600	0	0	0
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME N/A =Not applicable; CN = ControlUTC ENG: J. LEONE

UDRI P.I. ENG:

D.H. KALT

GT =Greater than 500 ppb LT = Less than 500 ppb

NSR =No Spec. Req. and/or 4 (x) Additive Concentration A.F. AUT. W./MLSA: L. PERKINS A.F. AUT. WL/POSF S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. IIM36 MATERIAL / IDENTITY: Ti 8-1MO-1V, TITANIUM TEST TEMPERATURE (°F) 325 **ENGINE FUEL LINES & COMPONENTS** USE: **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /92 POSF 2926

92 POSF 2926 + (JP-8 Additives) **TEST DATE START:** 2 APR 97 JP-8 BASELINE FUEL:

		TEST M	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS	5		
MATERIAL	ID	-8		ULTS 8 ±100	IPQ±1	00 (Y 4)	ORCEDUATIONS AND DEFENENCES		OVERAL	
PROPERTY TESTS	JP-8 JP-8 +100 JP8+100 (X4) PRE POST PRE POST PRE PO					00 (A4)	OBSERVATIONS AND REFERENCES	E.	VALUATI	.ON
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L1	L	L1	L	L1		CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	5.7927	5.7931	6.0130	6.0132	5.8520	5.8525				
GAIN / LOSS (gms)		+.0004		+.0002		+.0005		CN	W	W
MICROSCOPY EVAL.										

		•	="	•		•										
FUELS	Т			ERIAL EXIODS (28 D		E	P		CONTRO S. POST (STE	-	YS @ 325°	F)	SPEC. RANGE		ST RESU GENERA	
PROPERTY TESTS*							JI	P-8	JP-8	+ 100	JP-8 +	- 100 x4	FOR JP-8	OBS	SERVATIO	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C4	C5	С3	C6	C6	C6	С	C2	С	C2	C	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	272	99	429	74	675	94	50	4	300	57	569	241	150/600	0	0	0
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

N/A =Not applicable; CN = ControlUTC ENG: J. LEONE GT =

Greater than 500 ppb LT = Less than 500 ppb**UDRI P.I. ENG:** D.H. KALT No Spec. Req. and/or 4 (x) Additive Concentration NSR =A.F. AUT. W./MLSA: L. PERKINS

A.F. AUT. WL/POSF S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

IIM37 **MATERIAL / IDENTITY:** 4130 IVD COATING, ION VAPOR DEPOSIT TEST PLAN I.D. NO. TEST TEMPERATURE (°F) 325 **ENGINE FUEL LINES & COMPONENTS USE:**

EXPOSURE TIME (DAYS) 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /92 POSF 2926

14 AUG 97 92 POSF 2926 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

		TEST N	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESUL	TS		
MATERIAL			RES	ULTS					OVERAL	L
PROPERTY TESTS	JP-8 JP-8 +100 JP8+100 (X4) PRE POST PRE POST PRE POST		00 (X4)	OBSERVATIONS AND REFERENCES	E	VALUATI	ON			
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4
COLOR	L	L1	L	L1	L	L1		CN	W	W
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W
AVG. WT. (gms)	15.8705	15.8727	15.8982	15.9003	15.8913	15.8897				
GAIN / LOSS (gms)		+.0022		+.0021		0016		CN	W	W
MICROSCOPY EVAL.							·			
	Т	EST FUE	L / MAT	ERIAL E	XPOSUR	E	CONTROL FUEL SPEC.	TE	ST RESU	LTS

FUELS	T	-		ERIAL E		E	P		CONTRO S. POST (STR		YS @ 325°	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JP	- -8	JP-8	+ 100	JP-8 +	- 100 x4	FOR JP-8	OBS	ERVATI	ONS
	7	28	7	28	7	28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	С3	C5	С3	C5	C4	C5	С	C2	C	C2	С	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	260	147	399	113	591	176	50	4	300	57	569	241	150/600	0	0	0
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	160	NE	630	NE	650	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: Light (No Deposit) L1 - L2 = Discoloration/Deposits L =

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

ND = Not Detected; BD = Below Detection P = Pitting**Designations:** NE =Not Evaluated;

Comparisons:

W =DATE: 24 APR 98 Within Allowable Requirement; OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME

Not applicable; N/A =CN = ControlUTC ENG: J. LEONE

GT =Greater than 500 ppb LT = Less than 500 ppb **UDRI P.I. ENG:** D.H. KALT NSR =

No Spec. Req. and/or 4 (x) Additive Concentration L. PERKINS A.F. AUT. W./MLSA: A.F. AUT. WL/POSF S. A. ANDERSON

Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. IIM40 MATERIAL / IDENTITY: 303 STAINLESS STEEL TEST TEMPERATURE (°F) 325 **ENGINE FUEL LINES & COMPONENTS** USE: **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /92 POSF 2926 92 POSF 2926 + (JP-8 Additives) **TEST DATE START:** 2 DEC 97 JP-8 BASELINE FUEL:

		TEST M	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS								
MATERIAL			RES	ULTS				(OVERAL	L					
PROPERTY TESTS	JP	-8	JP-8	8 +100	JP8+1	00 (X4)	OBSERVATIONS AND REFERENCES	EV	ALUATI	ON					
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST		JP8	+100	X4					
COLOR	L	L1	L	L1	L	L1		CN	W	W					
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W					
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W					
AVG. WT. (gms)	26.6278	26.6283	26.4266	26.4268	26.8950	26.8951									
GAIN / LOSS (gms)		+.0005		+.0002		+.0001		CN	W	W					
MICROSCOPY EVAL.															

FUELS	Т			ERIAL EX IODS (28 D		E	P		CONTRO S. POST (STR	_	YS @ 325°	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JF	·-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7 28 7 28 7 28 C6 C5 C5 C6 C4 C6					28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C6	C5	C5	C6	C4	C6	С	C2	С	C2	С	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	190	133	407	112	612	165	50	4	300	57	569	241	150/600	0	0	0
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	160	NE	630	NE	650	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L =Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W =Within Allowable Requirement;

DATE: 24 APR 98 OT =Material Tested Beyond Temperature Range O = Outside Allowable Requirement **UDRI TECH:** A. BEHME N/A =Not applicable; CN = ControlUTC ENG: J. LEONE

GT =

Greater than 500 ppb LT = Less than 500 ppb**UDRI P.I. ENG:** D.H. KALT NSR =No Spec. Req. and/or 4 (x) Additive Concentration A.F. AUT. W./MLSA: L. PERKINS A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. IIM41 MATERIAL / IDENTITY: TI-CP-70 Titanium TEST TEMPERATURE (°F) 325 **ENGINE FUEL LINES & COMPONENTS** USE: **EXPOSURE TIME (DAYS)** 28 **TEST ADDITIVE/FUEL:** Betz Dearborn 8Q462 (Normal and x4 Concentrations) /92 POSF 2926 **TEST DATE START:** 2 DEC 97 JP-8 BASELINE FUEL: 92 POSF 2926 + (JP-8 Additives)

		TEST N	IATERIAL	/ FUEL EXP	OSURE		EVALUATION OF TEST RESULTS								
MATERIAL PROPERTY TESTS	JP	-8		ULTS 8 +100	.IP8+1	00 (X4)	OBSERVATIONS AND REFERENCES		OVERALI ALUATIO						
(AVG. 5 SPECIMENS)	PRE	POST	PRE	POST	PRE	POST	OBSERVATIONS AND REFERENCES	JP8	+100	X4					
COLOR	L	L2	L	L2	L	L2		CN	W	W					
PITTING (VISUAL)	ND	ND	ND	ND	ND	ND		CN	W	W					
PITTING (MICROSCOPY)	ND	ND	ND	ND	ND	ND		CN	W	W					
AVG. WT. (gms)	9.8310	9.8315	9.8023	9.8027	9.8681	9.8683									
GAIN / LOSS (gms)		+.0005		+.0004		+.0002		CN	W	W					
MICROSCOPY EVAL.							+100,X4 Blue Tint, EDS - Phosphorus								

FUELS	Т			ERIAL EX IODS (28 D		E	P		CONTRO S. POST (STR	_	YS @ 325°l	F)	SPEC. RANGE		T RESU GENERA	
PROPERTY TESTS*							JF	·-8	JP-8	+ 100	JP-8 +	100 x4	FOR JP-8	OBS	ERVATI	ONS
	7 28 7 28 7 28 C4 C5 C6 C6 C5 C6					28	PRE	POST	PRE	POST	PRE	POST	MIN / MAX	JP8	+100	X4
COLOR (7 DAYS)	C4	C5	C6	C6	C5	C6	С	C2	С	C2	C	C2		W	W	W
CONDUCTIVITY (AVG. of 4)	PRE	POST	PRE	POST	PRE	POST										
PS/M AT 72° F	238	147	406	98	611	168	50	4	300	57	569	241	150/600	0	0	0
GRAPHITE FURN/ICP (PPB)	7 DAY	28 DAY	7 DAY	28 DAY	7 DAY	28 DAY										
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE
	NE	NE	NE	NE	NE	NE	NE		NE		NE			NE	NE	NE

NOTES:

Metallic Color: L = Light (No Deposit) L1 - L2 = Discoloration/Deposits

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection P = Pitting

Comparisons: W = Within Allowable Requirement;

OT = Material Tested Beyond Temperature Range O = Outside Allowable Requirement UDRI TECH: A. BEHME
N/A = Not applicable; CN = Control UTC ENG: J. LEONE

GT = Greater than 500 ppb LT = Less than 500 ppb

NSR = No Spec. Req. and/or 4 (x) Additive Concentration

A.F. AUT. W./MLSA:

L. PERKINS

A.F. AUT. WL/POSF

S. A. ANDERSON

DATE:

UDRI P.I. ENG:

24 APR 98

D.H. KALT

TEST PLAN I.D. NO. I.O.1 **MATERIAL / IDENTITY:** UNICELLULAR BUNA-N TEST TEMPERATURE (°F) 225 AIRFRAME, FUEL SYSTEM LEVEL CONTROL FLOAT USE: 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: 27 JUL '95 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

	TEST MAT	TERIAL / FUEL	EXPOSURE	TEST	Γ EVALUA'	TION CRIT	TERIA		EVAl	LUATIO	OF TE	ST R	ESUL'	ΓS
MATERIAL		RESULTS		CONTROL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	NTROL &	(OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUI	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)														
ELONGATION (%)														
VOLUME SWELL (%)														
HARD'S; a) SHORE A (PTS)														
b) PENCIL														
COMP. SET (avg. 2 spcm's)														
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS	P	P	P	P	P		P		P	P	P	W	W	W
	TEST FUE	L / MATERIAL	EXPOSURE		1									

	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL							
FUELS	4 X 7 DA	Y PERIODS ((28 DAYS)		PRE-NEV	V) VS. POST (STRESSED) °1	F 7 DAYS		SPECIFICAT	TION RANGE		GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR	JP-8	OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C1	C1	С	C1	C	C1	C	C1			W	W	W
ACID NO. mgKOH/gm	.003	.001	.003	.001	.004	.001	.003	.003	.003		0.015	\mathbf{W}	W	\mathbf{W}
GUMS mg/100ml	2.4	3.8	11.4	2	3.2	4.4	4.8	9.6	3.8		7	W	W	О
HYDROPEROXIDES mM/l	.02	BD	BD	.004	.01	0	.01	0	.01			0	W	W
CONDUCTIVITY pS/m @72°F	41	328	503	108	39	248	131	912	410	150	600	О	W	W
VISUAL OBSERVATIONS													1	

NOTES:

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected;

Within Allowable Requirement; W =

BD = Below Detection; P = Pass; F = FailO = Outside Allowable Requirement

UDRI TECH:

24 MAR 98 J. DUES

OT =

Material Tested Beyond Temperature Range

UDRI ENG: UDRI P.I. ENG:

DATE:

B. WILT D.H. KALT

N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

A.F. AUT. W./MLSE: __A. FLETCHER A.F. AUT. WL/POSF S. A. ANDERSON

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

TEST PLAN I.D. NO. **I.O.2 MATERIAL / IDENTITY:** UNICELLULAR POLYURETHANE TEST TEMPERATURE (°F) 225 **USE:** AIRFRAME, FUEL SYSTEMS, LEVEL CONTROL FLOAT 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL:** 27 JUL '95 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

	TEST MAT	TERIAL / FUEL	EXPOSURE		TEST	EVALUA	TION CRIT	TERIA		EVAI	LUATIO	N OF TE	ST R	ESULT	rs
MATERIAL		RESULTS		CONTR	OL MAT	Α1	LLOWABLE	TOI FRAN	CF			ONTROL &	п —	OVERALI	
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)		RED AT	A	REOUIR	-	CE		BLE REOU			VALUATIO	
(AVG. 5 SPECIMENS)	POST	POST	POST		T TEMP	DECREASE	MIN VALUE	INCREASE	MAX	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
									VALUE						<u> </u>
TENSILE (PSI)															
ELONGATION (%)															<u> </u>
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL														<u> </u>	
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)														<u> </u>	
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS	P	P	P	J	2	P		P		P	P	P	W	W	W
	TEST FUEL	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 Y 7 DA	Y PERIODS (28 DAVS)		PRE-NEV	V) VS. POST (STRESSED) °I	F 7 DAYS		SPECI	FICATION	PANCE		GENERAI	
	.IP-8	JP-8 +100	JP8+100 (X4)	71	2-8		,		100 4	Sile		KANGE			
PROPERTY TESTS*	POST	POST	POST	PRE	POST	PRE	+ 100 POST	PRE	100 x4	MIN	FOR JP-8	MAX	JP8	SERVATIO +100	X4
	1031	1031	1031	PKE	POST	PKE	POST	PKE	POST	IVIIIN		WAA	JIO	+100	Α4
COLOR (7 DAYS)	C1	C1	C1	C	C1	C	C1	C	C1				\mathbf{W}	\mathbf{W}	\mathbf{W}
ACID NO. mgKOH/gm	.003	.002	.006	.001	.004	.001	.003	.003	.003			0.015	\mathbf{W}	W	W
GUMS mg/100ml	1.8	3.8	12.2	2	3.2	4.4	4.8	9.6	3.8			7	\mathbf{W}	\mathbf{W}	0
HYDROPEROXIDES mM/l	.02	BD	BD	.004	0.01	0	0.01	0	0.01				О	W	\mathbf{W}
CONDUCTIVITY pS/m @72°F	47	284	550	108	39	248	131	912	410	150		600	О	W	\mathbf{W}
VISUAL OBSERVATIONS												_			

NOTES:

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

W = Within Allowable Requirement; O = Outside Allowable Requirement

OT = Material Tested Beyond Temperature Range

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

DATE:

UDRI TECH:

UDRI P.I. ENG:

UDRI ENG:

24 MAR 98

J. DUES

B. WILT

A.F. AUT. W./MLSE: A. FLETCHER

A.F. AUT. WL/POSF S. A. ANDERSON

D.H. KALT

TEST PLAN I.D. NO. I.O.3 **MATERIAL / IDENTITY: POLYURETHANE, SAMPLE #1** TEST TEMPERATURE (°F) 225 **USE:** AIRFRAME, FUEL SYSTEM LEVEL CONTROL FLOAT 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL:** 27 JUL '95 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

	TEST MAT	ERIAL / FUEL	EXPOSURE		TEST	EVALUA'	TION CRIT	TERIA		EVAI	LUATIO	N OF TE	ST R	ESULT	ΓS
MATERIAL		RESULTS		CONTRO	OL MAT	A1	LLOWABLE	TOLERAN	CE			ONTROL &	п —	OVERAL	
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)		RED AT	111	REOUIR	-	CL		BLE REOU			ALUATI	
(AVG. 5 SPECIMENS)	POST	POST	POST		T TEMP	DECREASE	MIN VALUE	INCREASE	MAX	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
									VALUE						
TENSILE (PSI)															
ELONGATION (%)															<u> </u>
VOLUME SWELL (%)															-
HARD'S; a) SHORE A (PTS)															-
b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS	P	P	P]	P	P		P		P	P	P	\mathbf{W}	\mathbf{W}	W
	TEST FUEL	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 Y 7 DA	Y PERIODS (28 DAVS)		PRE-NEV	V) VS. POST	(STRESSED) °	F 7 DAYS		SPECI	FICATION	PANCE		GENERA	r
PROPERTY TESTS*	.IP-8	JP-8 +100	JP8+100 (X4)	TT	·-8		+ 100		100 x4	Silei	FOR JP-8	MINGE		-	
PROPERTY TESTS"	POST	POST	POST	PRE					-	MIN	FOR JP-8	MAX	JP8	SERVATIO +100	X4
	1031	FOST	FOST	PKE	POST	PRE	POST	PRE	POST	IVIIIN		MAA	JFo	+100	Α4
COLOR (7 DAYS)	C2	C1	C1	C	C1	C	C1	C	C1				\mathbf{W}	\mathbf{W}	\mathbf{W}
ACID NO. mgKOH/gm	.003	.003	.004	.001	0.004	.001	0.003	0.003	0.003			0.015	\mathbf{W}	W	\mathbf{W}
GUMS mg/100ml	1.2	2.2	11.8	2	3.2	4.4	4.8	9.6	3.8			7	\mathbf{W}	\mathbf{W}	O
HYDROPEROXIDES mM/l	.02	BD	BD	.004	0.01	0	0.01	0	0.01				О	W	\mathbf{W}
CONDUCTIVITY pS/m @72°F	52	271	650	108	39	248	131	912	410	150		600	О	W	О
VISUAL OBSERVATIONS												_		_	

NOTES:

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

W = Within Allowable Requirement; O = Outside Allowable Requirement

OT = Material Tested Beyond Temperature Range

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

A.F. AUT. WL/POSF

S. A. ANDERSON

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

DATE:

UDRI TECH:

UDRI P.I. ENG:

UDRI ENG:

24 MAR 98

J. DUES

B. WILT

D.H. KALT

TEST PLAN I.D. NO. **I.O.4** MATERIAL / IDENTITY: POLYURETHANE, SAMPLE #2 TEST TEMPERATURE (°F) 225 USE: AIRFRAME, FUEL SYSTEM, LEVEL CONTROL FLOAT 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL:** 11 OCT '95 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

	TEST MAT	TERIAL / FUEL	EXPOSURE		TEST	EVALUA'	TION CRIT	TERIA		EVAI	LUATIO	ON OF TE	ST R	ESULT	ΓS
MATERIAL		RESULTS		CONTR	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO C	CONTROL &		OVERALI	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUI	REMENT		ALLOWA	BLE REQU	JIREMENTS	EV	VALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	NT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)															
ELONGATION (%)															
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS	P	P	P]	<u>P</u>	P		P		P	P	P	W	W	W
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	W) VS. POST	(STRESSED) °	F 7 DAYS		SPECI	IFICATION	N RANGE	'	GENERAI	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	P-8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-8	8	OBS	SERVATIO	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C1	C2	С	C1	С	C1	С	C1				W	W	W
ACID NO. mgKOH/gm	.004	.002	.004	.001	0.004	.001	0.003	0.003	0.003			0.015	\mathbf{W}	\mathbf{W}	\mathbf{W}
GUMS mg/100ml	2.4	4.6	13.0	2	3.2	4.4	4.8	9.6	3.8			7	W	W	О
HYDROPEROXIDES mM/l	.01	BD	BD	.004	0.01	0	0.01	0	0.01				\mathbf{W}	W	\mathbf{W}
CONDUCTIVITY pS/m @72°F	59	621	562	108	39	248	131	912	410	150		600	0	W	W

NOTES:

VISUAL OBSERVATIONS

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Not Evaluated: ND = Not Detected: **Designations:** NE =BD = Below Detection: P = Pass: F = Fail

Within Allowable Requirement; W =O = Outside Allowable Requirement

OT =**Material Tested Beyond Temperature Range**

NSR = No Spec. Req. and/or 4 (x) Additive Concentration N/A =Not applicable;

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: A. FLETCHER Between Material Degradation and Fuel Properties Degradation A.F. AUT. WL/POSF S. A. ANDERSON

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

DATE:

UDRI TECH:

UDRI P.I. ENG:

UDRI ENG:

24 MAR 98

J. DUES

B. WILT

D.H. KALT

TEST PLAN I.D. NO. I.O.5 **MATERIAL / IDENTITY:** POLYURETHANE, SAMPLE #3 TEST TEMPERATURE (°F) 225 **USE:** AIRFRAME, FUEL SYSTEM LEVEL CONTROL FLOAT 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL:** 11 OCT '95 93 POSF 2980 **TEST DATE START:** JP-8 BASELINE FUEL: + (JP-8 Additives)

	TEST MAT	ERIAL / FUEL	EXPOSURE		TEST	EVALUA	TION CRIT	ERIA		EVAI	LUATI	ON OF TE	ST R	ESUL 7	ΓS
MATERIAL		RESULTS		CONTR	OL MAT	AI	LOWABLE	TOLERAN	CE	COMPAR	ISON TO	CONTROL &	(OVERALI	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIR	REMENT		ALLOWA	BLE REQ	UIREMENTS	EV	VALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+10	0 JP-8+100x4	JP8	+100	X4
TENSILE (PSI)															
ELONGATION (%)															
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS	P	P	P	J	<u> </u>	P		P		P	P	P	W	W	W
	TEST FUEL	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	V) VS. POST (STRESSED) °I	F 7 DAYS		SPECI	FICATIO	N RANGE		GENERAI	
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JF	P-8	JP-8	+ 100	JP-8 +	100 x4		FOR JP	-8	OBS	SERVATIO	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C1	C1	C	C1	C	C1	C	C1				W	W	W
ACID NO. mgKOH/gm	.004	.002	.005	.001	0.004	.001	0.003	.003	0.003			0.015	\mathbf{W}	\mathbf{W}	W
GUMS mg/100ml	2.4	4.2	12.4	2	3.2	4.4	4.8	9.6	3.8			7	W	W	0
HYDROPEROXIDES mM/l	.01	BDL	BDL	.004	0.01	0	0.01	0	0.01				\mathbf{W}	W	W
CONDUCTIVITY pS/m @72°F	55	267	641	108	39	248	131	912	410	150		600	О	\mathbf{W}	O

NOTES:

VISUAL OBSERVATIONS

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

W = Within Allowable Requirement; O = Outside Allowable Requirement

OT = Material Tested Beyond Temperature Range

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation DATE: 24 MAR 98
UDRI TECH: J. DUES
UDRI ENG: B. WILT
UDRI P.I. ENG: D.H. KALT
A.F. AUT. W./MILSE: A. FLETCHER
A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. I.O.6 MATERIAL / IDENTITY: **POLYURETHANE, SAMPLE #4** TEST TEMPERATURE (°F) 225 **USE:** AIRFRAME, FUEL SYSTEM, LEVEL CONTROL FLOAT 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL:** 11 OCT '95 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

	TEST MAT	TERIAL / FUEL	EXPOSURE		TEST	EVALUA	TION CRIT	ERIA		EVAI	LUATIO	ON OF TE	ST R	ESULT	ΓS
MATERIAL		RESULTS		CONTR	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO C	ONTROL &	,	OVERALI	<u></u>
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIF	REMENT		ALLOWA	BLE REQU	IREMENTS	E	VALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)															
ELONGATION (%)															
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)													<u> </u>		<u> </u>
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)													<u> </u>		<u> </u>
TORQUE (INCH -LBS.)													<u> </u>		<u> </u>
RUPTURE PRESS. (IN.HG)													<u> </u>		<u> </u>
VISUAL OBSERVATIONS	P	P	P]	•	P		P		P	P	P	W	W	W
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	W) VS. POST ((STRESSED) °	F 7 DAYS		SPECI	FICATION	RANGE	,	GENERAI	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	- -8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-8	}	OBS	SERVATIO	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C1	C2	C	C1	C	C1	С	C1				W	W	W
ACID NO. mgKOH/gm	.004	.003	.005	.001	0.004	.001	0.003	0.003	0.003			0.015	W	W	W
GUMS mg/100ml	1.8	4.0	11.6	2	3.2	4.4	4.8	9.6	3.8			7	W	W	О
HYDROPEROXIDES mM/l	.01	BD	BD	.004	0.01	0	0.01	0	0.01				W	W	\mathbf{W}
CONDUCTIVITY pS/m @72°F	53	263	564	106	39	248	131	912	410	150		600	0	W	\mathbf{W}

NOTES:

VISUAL OBSERVATIONS

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

W = Within Allowable Requirement; O = Outside Allowable Requirement

OT = Material Tested Beyond Temperature Range

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation DATE: 24 MAR 98
UDRI TECH: J. DUES
UDRI ENG: B. WILT
UDRI P.I. ENG: D.H. KALT
A.F. AUT. W./MLSE: A. FLETCHER
A.F. AUT, WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. I.O.7 **MATERIAL / IDENTITY:** FLOATS, FOAM TEST TEMPERATURE (°F) 225 **USE:** AIRFRAME, for AEROSPACE LEVEL CONTROL VALVES Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 28 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL:** 24 AUG '95 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

	TEST MAT	TERIAL / FUEL	EXPOSURE		TEST	EVALUA'	TION CRIT	TERIA		EVAI	LUATIO	ON OF TE	ST R	ESULT	<u>rs</u>
MATERIAL		RESULTS		CONTR	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO C	CONTROL &	•	OVERALI	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIF	REMENT		ALLOWA	BLE REQU	IREMENTS	E	VALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)															
ELONGATION (%)															
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL															
COMP. SET (avg. 2 spcm's)													<u> </u>	<u> </u>	
LAP SHEAR (PSI)															
COHESION (%)													<u> </u>	<u> </u>	
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)													<u> </u>	<u> </u>	
TORQUE (INCH -LBS.)													<u> </u>	<u> </u>	
RUPTURE PRESS. (IN.HG)													ļ		
VISUAL OBSERVATIONS	P	P	P]	<u>P</u>	P		P		P	P	P	W	W	W
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	W) VS. POST ((STRESSED) °	F 7 DAYS		SPECI	FICATION	RANGE	1	GENERAL	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	P-8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-8	3	OBS	SERVATIO	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	C1	C1	C1	С	C1	С	C1	С	C1				W	W	W
ACID NO. mgKOH/gm	.003	.003	.004	.001	.004	.001	.003	.003	.003			0.015	W	W	W
GUMS mg/100ml	1.6	5.0	12.4	2	3.2	4.4	4.8	9.6	3.8			7	W	W	О
HYDROPEROXIDES mM/l	.01	BD	BD	.004	0.01	0	0.01	0	0.01				W	NE	NE
CONDUCTIVITY pS/m @72°F	48	273	567	108	39	248	131	912	410	150		600	0	W	\mathbf{W}

NOTES:

VISUAL OBSERVATIONS

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

W = Within Allowable Requirement; O = Outside Allowable Requirement

OT = Material Tested Beyond Temperature Range

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists
Between Material Degradation and Fuel Properties Degradation

UDRI TECH:
UDRI ENG:
B. WILT
UDRI P.I. ENG:
A.F. AUT. W./MLSE:
A.F. AUT. WL/POSF
S. A. ANDERSON

24 MAR 98

DATE:

TEST PLAN I.D. NO. I.O.8/I.G.13 **MATERIAL / IDENTITY:** CORK TEST TEMPERATURE (°F) 200 **USE:** AIRFRAME, FUEL SYSTEM, LEVEL CONTROL FLOAT 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL:** 27 AUG '96 93 POSF 2980 **TEST DATE START:** JP-8 BASELINE FUEL: + (JP-8 Additives)

	TEST MAT	TERIAL / FUEL	EXPOSURE		TEST	FVALUA	TION CRIT	FRIA		EXAL	TIATIO	N OF TE	CT D	retit 1	rc
													n		
MATERIAL		RESULTS		CONTR		Al	LLOWABLE		CE		ISON TO CO			OVERALI	
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)		RED AT		REQUIE				BLE REQUI			ALUATIO	-
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)															
ELONGATION (%)															
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS	P	P	P		P	P		P		P	P	P	W	W	W
	TEST FUEL	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 Y 7 DA	Y PERIODS (28 DAVS)		PRE-NEV		(STRESSED) °	F 7 DAYS		SPECI	FICATION	RANGE		GENERAI	
	JP-8	JP-8 +100	JP8+100 (X4)	71	2-8		+ 100		100 x4	Sile	FOR JP-8	KANGE		SERVATION	
PROPERTY TESTS*	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	FUK JP-8	MAX	JP8	+100	X4
	1031	1031	1031	PKE	rosi	PKE	rosi	PKE	rosi	IVIIIV		MAX	J1 0	+100	A-T
COLOR (7 DAYS)	CC1	C1	C1	C	C1	C	C1	C	C1				\mathbf{W}	W	\mathbf{W}
ACID NO. mgKOH/gm	0.005	0.005	.007	.001	.001	.001	.002	.003	.003			0.015	\mathbf{W}	W	\mathbf{W}
GUMS mg/100ml	2.4	17.6	6.6	2	.8	4.4	2.8	9.6	8.6			7	\mathbf{W}	W	W
HYDROPEROXIDES mM/l	BD	0.02	0.02	.004	.002	0	.032	0	.018						
CONDUCTIVITY pS/m @72°F	107	291	539	108	66	248	131	912	410	150		600	О	W	W
VISUAL OBSERVATIONS	0.1242	0.1542	0.1106										\mathbf{W}	W	\mathbf{W}

NOTES:

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

W = Within Allowable Requirement; O = Outside Allowable Requirement

OT = Material Tested Beyond Temperature Range

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

A.F. AUT. WL/POSF

S. A. ANDERSON

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

DATE:

UDRI TECH:

UDRI P.I. ENG:

UDRI ENG:

24 MAR 98

J. DUES

B. WILT

D.H. KALT

TEST PLAN I.D. NO. I.P.1/I.A.5 **MATERIAL / IDENTITY:** EPOXY, EPON TEST TEMPERATURE (°F) 200 USE: AIRFRAME, POTTING COMPOUND 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: 13 OCT '95 **TEST DATE START:** JP-8 BASELINE FUEL: 92 POSF 2926 + (JP-8 Additives)

	TEST MAT	TERIAL / FUEL	EXPOSURE		TEST	'EVALUA'	TION CRIT	TERIA		EVAI	LUATIO	N OF TE	ST R	ESULT	ГS
MATERIAL		RESULTS		CONTR	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	NTROL &	(OVERALI	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIF	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	VALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)															
ELONGATION (%)															
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)	2949	2880	3208	31	95	15				-7.6	-9.9	+.4	\mathbf{W}	W	\mathbf{W}
COHESION (%)	100	100	100	10)0		100%			P	P	P	W	W	W
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV		(STRESSED) °	F 7 DAYS		SPECI	FICATION 1	RANGE	(GENERAI	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JF	P-8	JP-8	+ 100	JP-8 +	- 100 x4	1	FOR JP-8		OBS	SERVATIO	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	С	C1	С	C1	С	C1			_	NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.001	.001	.002	.003	.003			0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	.6	.8	4.4	2.8	9.6	8.6			7	NE	NE	NE

0

248

.032

131

0

912

.018

410

DATE:

UDRI TECH:

NOTES:

HYDROPEROXIDES mM/I

CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

NE

NE

Not Evaluated: ND = Not Detected: **Designations:** NE =BD = Below Detection: P = Pass:

NE

NE

W =Within Allowable Requirement; O = Outside Allowable Requirement

.001

100

OT =**Material Tested Beyond Temperature Range**

NE

NE

NSR = No Spec. Req. and/or 4 (x) Additive Concentration N/A =Not applicable;

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

UDRI ENG: B. WILT UDRI P.I. ENG: D.H. KALT A.F. AUT. W./MLSE: A. FLETCHER A.F. AUT. WL/POSF S. A. ANDERSON

150

NE

NE

600

24 MAR 98

J. DUES

NE

NE

NE

NE

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

.002

66

TEST PLAN I.D. NO. I.P.2.1 **MATERIAL / IDENTITY:** POLYSULFIDE/(FILM), MIL-S-8516 AIRFRAME, POTTING COMPOUND TEST TEMPERATURE (°F) 200 USE: 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL:** 22 JAN '95 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

	TEST MAT	ERIAL / FUEL	EXPOSURE	TEST	EVALUA	TION CRIT	TERIA		EVAI	LUATION	OF TE	ST R	ESUL	ΓS
MATERIAL		RESULTS		CONTROL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	NTROL &	(OVERAL!	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUIF	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	116	199	211	256	20%				-55	-22	-18	0	W	W
ELONGATION (%)	68	36	26	208	20				-67	-83	-88	0	0	О
VOLUME SWELL (%)	-32	-39	-42	NA		-20			F	F	F	О	O	O
HARD'S; a) SHORE A (PTS)	41	60	68	47	10pts		10pts		-6	+13	+21	\mathbf{W}	0	О
b) PENCIL														
COMP. SET (avg. 2 spcm's)														
LAP SHEAR (PSI)														
COHESION (%)	8	100	100	NA		100			F	P	P	О	W	\mathbf{W}
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)	2	14	13	NA		20			F	F	F	О	0	О
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														

	TEST FUEI	L / MATERIAL	EXPOSURE			CONTR	OL FUEL							
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	V) VS. POST (STRESSED) °1	F 7 DAYS		SPECIFICAT	TION RANGE		GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JF	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR	JP-8	OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	C	C1	C	C1	C	C1			NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.001	.001	.002	.003	.003		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	2	.8	4.4	2.8	9.6	8.6		7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.004	.002	0	.032	0	.018			NE	NE	NE
CONDUCTIVITY pS/m @72°F	NE	NE	NE	108	66	248	131	912	410	150	600	NE	NE	NE
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

W = Within Allowable Requirement; O = Outside Allowable Requirement

OT = Material Tested Beyond Temperature Range

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

A.F. AUT. V

Between Material Degradation and Fuel Properties Degradation

A.F. AUT. V

UDRI P.I. ENG:
A.F. AUT. W./MLSE:
A.F. AUT. WL/POSF
S. A. ANDERSON

24 MAR 98

J. DUES

B. WILT

DATE:

UDRI TECH:

UDRI ENG:

TEST PLAN I.D. NO. I.P.2.2 **MATERIAL / IDENTITY:** MIL-S-8516, POLYSULFIDE AIRFRAME, POTTING COMPOUND, CONNECTOR APPLICATION TEST TEMPERATURE (°F) 200 **USE:** Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 28 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL: NOV 96** 92 POSF 2926 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

					-				(2	,				_	
	TEST MAT	TERIAL / FUEL	EXPOSURE		TEST	'EVALUA'	TION CRIT	TERIA		EVA	LUATIO	N OF TE	ST R	ESUL	ΓS
MATERIAL		RESULTS		CONTR	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	ONTROL &	•	OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUI	REMENT		ALLOWA	BLE REQUI	REMENTS	E	VALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)															
ELONGATION (%)															
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS	*F	*F	*F	J			P			F	F	F	0	0	0
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	W) VS. POST (STRESSED) °	F 7 DAYS		SPEC	IFICATION	RANGE		GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JF	·-8	JP-8	+ 100	JP-8 +	- 100 x4		FOR JP-8		OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
1										()					

	TEST FUE	L / MATERIAL	EXPOSURE			CONTRO	OL FUEL							
FUELS	4 X 7 DA	Y PERIODS	(28 DAYS)		PRE-NEV	W) VS. POST (STRESSED) °1	F 7 DAYS		SPECIFICA	TION RANGE	1 (GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR	JP-8	OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)				С	C1	С	C1	С	C1					
ACID NO. mgKOH/gm				.001	.001	.001	.002	.003	.003		0.015			
GUMS mg/100ml				.6	.8	4.4	2.8	9.6	8.6		7			
HYDROPEROXIDES mM/l				.001	.002	0	.038	0	.018					
CONDUCTIVITY pS/m @72°F				100	66	248	131	912	410	150	600			
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

W = Within Allowable Requirement; O = Outside Allowable Requirement

OT = Material Tested Beyond Temperature Range

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation DATE: 24 MAR 98
UDRI TECH: J. DUES
UDRI ENG: B. WILT
UDRI P.I. ENG: D.H. KALT
A.F. AUT. W./MLSE: A. FLETCHER
A.F. AUT. WL/POSF S. A. ANDERSON

II.P.2.2 at 200°F

Insulation Resistance As received Cure a Diallyl Phthalate
As received Cure a Diallyl Phthalate Case to Terminal 2P 1P 0.60E+10 1P 0.90E+10 3P 1.00E+11 4P 8.50E+10 5P 7 9.80E+10 Terminal to Terminal 2P 2.10E+11 1P 2.10E+11 3P 2.60E+11 4P 2.60E+11 5P 3.10E+11
Cure a Diallyl Phthalate 1.000 megohm. min Case to Terminal 0.60E+10 1P 0.90E+10 3P 1.00E+11 4P 8.50E+10 5P 9.80E+10 Terminal to Terminal 3.00E+11 2P 2.10E+11 1P 2.10E+11 3P 2.60E+11 4P 2.60E+11 5P 3.10E+11
Case to Terminal 2P
2P
1P 0.90E+10 3P 1.00E+11 4P 8.50E+10 5P 9.80E+10 Terminal to Terminal 3.00E+11 2P 2.10E+11 1P 2.10E+11 3P 2.60E+11 4P 2.60E+11 5P 3.10E+11
3P
4P 8.50E+10 5P 9.80E+10 Terminal to Terminal 3.00E+11 2P 2.10E+11 1P 2.10E+11 3P 2.60E+11 4P 2.60E+11 5P 3.10E+11
5P 9.80E+10 Terminal to Terminal 3.00E+11 2P 2.10E+11 1P 2.10E+11 3P 2.60E+11 4P 2.60E+11 5P 3.10E+11
Terminal to Terminal 3.00E+11 2P 2.10E+11 1P 2.10E+11 3P 2.60E+11 4P 2.60E+11 5P 3.10E+11
2P 2.10E+11 1P 2.10E+11 3P 2.60E+11 4P 2.60E+11 5P 3.10E+11
1P 2.10E+11 3P 2.60E+11 4P 2.60E+11 5P 3.10E+11
1P 2.10E+11 3P 2.60E+11 4P 2.60E+11 5P 3.10E+11
4P 2.60E+11 5P 3.10E+11
5P 3.10E+11
After 28 days @ 200°F
After 28 days (@ 200°F
Diallyl Phthelalate
Case to Terminal
in JP-8 2P 9.70E+10
in JP-8/BETZ 1P 9.20E+10
in JP-8/BETZ(4) 3P 1.40E+11
III 31 -0/DE12(¬) 31 1.¬0E+11
Terminal to Terminal
in JP-8 2P 2.50E+11
in JP-8/BETZ 1P 3.40E+11
in JP-8/BETZ(4) 3P 3.70E+11

FUEL / MATERIAL COMPATIBILITY TEST RESULTS TEST PLAN I.D. NO. **I.P.3 MATERIAL / IDENTITY:** FLUOROSILICONE, AMS 3361 TEST TEMPERATURE (°F) 200 **USE:** AIRFRAME, POTTING COMPOUND 28 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL:**

TEST DATE START:		NTP		JP-8 B	ASELINE 1	FUEL:	92 POS	F 2926 +	- (JP-8 Add	itives)				_	
	TEST MAT	ΓERIAL / FUEL	EXPOSURE		TEST	EVALUA	TION CRIT	ΓERIA		EVA	LUATIO	N OF TE	ST R	ESUL'	TS
MATERIAL		RESULTS		CONTR	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO C	ONTROL &	(OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUII	REMENT		ALLOWA	BLE REQU	IREMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	NT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)														 I	
ELONGATION (%)														·	
VOLUME SWELL (%)														1	
HARD'S; a) SHORE A (PTS)														<u> </u>	
b) PENCIL														<u> </u>	
COMP. SET (avg. 2 spcm's)														i	
LAP SHEAR (PSI)														<u> </u>	
COHESION (%)															
TAPE ADHESION (P/F)														<u> </u>	
PEEL STRENGTH (LB/IN)														<u> </u>	
LAMINAR SHEAR (PSI)														<u> </u>	
RESISTIVITY (OHM-CM)														<u> </u>	
TORQUE (INCH -LBS.)														<u> </u>	
RUPTURE PRESS. (IN.HG)														<u> </u>	
VISUAL OBSERVATIONS															
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	AY PERIODS (28 DAYS)		PRE-NE	W) VS. POST (STRESSED) °	F 7 DAYS		SPEC	IFICATION	RANGE	(GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	P-8	JP-8	+ 100	JP-8 +	- 100 x4	1	FOR JP-8		OBS	SERVATI	ONS
1.131.2	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)														1	\vdash
ACID NO. mgKOH/gm												0.015			
GUMS mg/100ml												7			

NOTES:

HYDROPEROXIDES mM/I CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Not Evaluated: ND = Not Detected: **Designations:** NE =BD = Below Detection: P = Pass: F = Fail

W =Within Allowable Requirement; O = Outside Allowable Requirement

OT =**Material Tested Beyond Temperature Range**

NSR = No Spec. Req. and/or 4 (x) Additive Concentration N/A =Not applicable;

UDRI P.I. ENG: D.H. KALT * Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: A. FLETCHER Between Material Degradation and Fuel Properties Degradation A.F. AUT. WL/POSF S. A. ANDERSON

Overall Evaluation: When JP-8+100 and/or x4 Res ults are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

150

DATE:

UDRI TECH:

UDRI ENG:

600

24 MAR 98

J. DUES

B. WILT

FUEL / MATERIAL COMPATIBILITY TEST RESULTS TEST PLAN I.D. NO. **MATERIAL / IDENTITY:** I.P.4 URETHANE TEST TEMPERATURE (°F) AIRFRAME, POTTING COMPOUND 200 USE: 28 TEST ADDITIVE/FUEL: Betz/Dearborn 8O462 ((Normal and x4 Concentrations) /93 POSF 2980 EXPOSURE TIME (DAYS) NTP 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL: TEST MATERIAL / FUEL EXPOSURE **EVALUATION OF TEST RESULTS** TEST EVALUATION CRITERIA CONTROL MAT **MATERIAL** RESULTS ALLOWABLE TOLERANCE COMPARISON TO CONTROL & **OVERALL** JP8+100 (X4) PROPERTY TESTS JP-8 JP-8 +100 MEASURED AT REQUIREMENT ALLOWABLE REQUIREMENTS **EVALUATION** DECREASE MIN VALUE INCREASE POST POST POST (AVG. 5 SPECIMENS) AMBIENT TEMP JP-8+100 JP-8+100x4 JP8 +100 TENSILE (PSI) **ELONGATION (%) VOLUME SWELL (%)** HARD'S: a) SHORE A (PTS) b) PENCIL COMP. SET (avg. 2 spcm's) LAP SHEAR (PSI) **COHESION (%)** TAPE ADHESION (P/F) PEEL STRENGTH (LB/IN) LAMINAR SHEAR (PSI) RESISTIVITY (OHM-CM) TOROUE (INCH -LBS.) **RUPTURE PRESS. (IN.HG)** VISUAL OBSERVATIONS TEST FUEL / MATERIAL EXPOSURE CONTROL FUEL **FUELS** 4 X 7 DAY PERIODS (28 DAYS) PRE-NEW) VS. POST (STRESSED) °F 7 DAYS SPECIFICATION RANGE GENERAL JP-8 +100 JP8+100 (X4) PROPERTY TESTS* JP-8 JP-8 + 100 x4JP-8 + 100FOR JP-8 OBSERVATIONS POST POST POST MIN MAX JP8 +100 PRE POST PRE POST PRE POST COLOR (7 DAYS) ACID NO. mgKOH/gm 0.015

NOTES:

GUMS mg/100ml

HYDROPEROXIDES mM/l CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected;

W = Not Evaluated; ND = Not Detected; W = Within Allowable Requirement; BD = Below Detection; P = Pass; F = Fail O = Outside Allowable Requirement

UDRI TECH: J. DUES
UDRI ENG: B. WILT

600

24 MAR 98

150

DATE:

OT = Material Tested Beyond Temperature Range

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

UDRI P.I. ENG:
A.F. AUT. W./MLSE:
A.F. AUT. WL/POSF
A.F. AUT. WL/POSF
S. A. ANDERSON

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. **I.B.4 MATERIAL / IDENTITY: NITRILE** AIRFRAME, FUEL TANK BLADDER INNERLINER TEST TEMPERATURE (°F) 200 **USE: EXPOSURE TIME (DAYS)** 7 **TEST ADDITIVE/FUEL:** Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 TEST DATE START: 9 JUN '94 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

	TEST MAT	TERIAL / FUEL	EXPOSURE	TEST	EVALUA	TION CRIT	ERIA		EVAI	LUATION	OF TES	ST R	ESUL	ΓS
MATERIAL		RESULTS		CONTROL MAT	Al	LOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	NTROL &	(OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUIR	REMENT		ALLOWA	BLE REQUIE	REMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	1982	2136	2116	2441	50%				-19	-13	-13	W	W	W
ELONGATION (%)	369	357	348	568	35				35	37	39	\mathbf{W}	OT	OT
VOLUME SWELL (%)	-2	-3	-3	N/A				12	P	P	P	\mathbf{W}	\mathbf{W}	\mathbf{W}
HARD'S; a) SHORE A (PTS)														
b) PENCIL														
COMP. SET (avg. 2 spcm's)														
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)													•	
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														
	TEST FUE	L / MATERIAL	EXPOSURE		CONTR	OI FIIFI								

	TEST FUEL	L / MATERIAL	EXPOSURE			CONTR	OL FUEL							
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	V) VS. POST (STRESSED) °1	F 7 DAYS		SPECIFICAT	ΓΙΟΝ RANGE		GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR	JP-8	OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	C1	C1	C1	С	C1	C	C1	C	C1			W	W	W
ACID NO. mgKOH/gm	NE	NE	NE	0.001	0.002	0.001	0.002	0.003	0.003		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	2	4.8	4.4	2.8	9.6	8.6		7	NE	NE	NE
HYDROPEROXIDES mM/I	NE	NE	NE	0.004	0.037	0	0.038	0	0.018			NE	NE	NE
CONDUCTIVITY pS/m @72°F	502	880	1191	108	39	248	131	912	410	150	600	W	0	О
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = FailDATE: 17 Sept '98 W =Within Allowable Requirement: O = Outside Allowable Requirement UDRI TECH: J. DUES UDRI ENG: B. WILT

OT =**Material Tested Beyond Temperature Range**

N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

UDRI P.I. ENG: D.H. KALT * Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: A. FLETCHER Between Material Degradation and Fuel Properties Degradation A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. **I.B.5 MATERIAL / IDENTITY:** BLADDER TANK, POLYURETHANE TEST TEMPERATURE (°F) 200 USE: AIRFRAME, FUEL TANK BLADDER, INNERLINER 7 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: 9 JUN '94 93 POSF 2980 **TEST DATE START:** JP-8 BASELINE FUEL: + (JP-8 Additives)

	TEST MAT	TERIAL / FUEL	EXPOSURE		TEST	EVALUA	TION CRIT	ERIA		EVAI	LUATIO	N OF TE	ST R	ESULT	ΓS
MATERIAL		RESULTS		CONTR	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	ONTROL &	(OVERALI	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIF	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	VALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	2411	2589	2481	32	92	50%				-27	-21	-25	W	W	W
ELONGATION (%)	610	596	605	44	19	35%				+35	+33	+35	\mathbf{W}	W	W
VOLUME SWELL (%)	13	11	29	N.	/ A				12%	F	P	F	OT	W	OT
HARD'S; a) SHORE A (PTS) b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)														<u> </u>	<u> </u>
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)														<u> </u>	
RESISTIVITY (OHM-CM)														<u> </u>	
TORQUE (INCH -LBS.)														<u></u>	
RUPTURE PRESS. (IN.HG)														<u></u>	
VISUAL OBSERVATIONS															
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NE	W) VS. POST ((STRESSED) °	F 7 DAYS		SPECI	FICATION	RANGE	(GENERAI	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	- -8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-8		OBS	SER VATIO	ONS
	POST	POST	POST	PRE POST		PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	C C1		C	C1	C	C1						
ACID NO. mgKOH/gm	NE	NE	NE	.001	.002	.001	.002	.003	.003			0.015		1	

4.4

0

248

2.8

.038

131

9.6

0

912

8.6

.018

410

NOTES:

HYDROPEROXIDES mM/l

CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

GUMS mg/100ml

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

NE

NE

135

Not Evaluated: ND = Not Detected: **Designations:** NE =BD = Below Detection: P = Pass: F = Fail

NE

NE

635

W =Within Allowable Requirement; O = Outside Allowable Requirement OT =

2

.004

108

Material Tested Beyond Temperature Range NSR = No Spec. Req. and/or 4 (x) Additive Concentration N/A =Not applicable;

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

NE

NE

271

Between Material Degradation and Fuel Properties Degradation

DATE: 24 MAR 98 UDRI TECH: J. DUES UDRI ENG: B. WILT UDRI P.I. ENG: D.H. KALT A.F. AUT. W./MLSE: A. FLETCHER A.F. AUT. WL/POSF S. A. ANDERSON

150

7

600

O

 \mathbf{W}

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

4.8

.037

39

TEST PLAN I.D. NO.	I.C.2	MATERIAL / IDENTITY:	COATING, POLYURETHANE, MIL-C-27725
TEST TEMPERATURE (°F)	200	USE:	AIRFRAME, INTEGRAL FUEL TANK COATING
EXPOSURE TIME (DAYS)	7	TEST ADDITIVE/FUEL:	Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980
TEST DATE START:	9 JUNE '94	JP-8 BASELINE FUEL:	93 POSF 2980 + (JP-8 Additives)

	TEST MAT	TERIAL / FUEL	EXPOSURE		TEST	EVALUA'	TION CRIT	ERIA		EVAI	LUATIO	N OF TE	ST R	ESUL?	ΓS
MATERIAL		RESULTS		CONTR	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	ONTROL &		OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIF	REMENT		ALLOWA	BLE REQUI	REMENTS	E	VALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	NT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)															
ELONGATION (%)															
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL	>6H	>6H	>6H	>6	6H	0				P	P	P	\mathbf{W}	W	W
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)	P	P	P]	P		P			P	P	P	\mathbf{W}	\mathbf{W}	\mathbf{W}
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	W) VS. POST ((STRESSED) °	F 7 DAYS		SPECI	IFICATION 1	RANGE		GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	P-8	JP-8	+ 100	JP-8 +	100 x4	1	FOR JP-8		ОВ	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	С	C1	С	C1	С	C1						
ACID NO. mgKOH/gm	NE	NE	NE	.001	.002	.001	.002	.003	.003			0.015			
GUMS mg/100ml	NE	NE	NE	2	4.8	4.4	2.8	9.6	8.6			7			

NOTES:

HYDROPEROXIDES mM/l

CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

Fuel Color: C = Clear C1 - C6 = Light to Dark

NE

27

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

.004

108

NE

423

W = Within Allowable Requirement; O = Outside Allowable Requirement UDRI TECH: J. DUES
OT = Material Tested Beyond Temperature Range
N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration UDRI P.I. ENG: D.H. KALT

0

248

.038

131

0

912

.018

410

DATE:

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

NE

683

Between Material Degradation and Fuel Properties Degradation

UDRI P.I. ENG:

A.F. AUT. W./MLSE:

A.F. AUT. WL/POSF

S. A. ANDERSON

150

600

0

0

 \mathbf{W}

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

.037

39

TEST PLAN I.D. NO. I.D.2/I.C.4 **MATERIAL / IDENTITY:** MANGANESE, MIL-S-8802 TEST TEMPERATURE (°F) 200 AIRFRAME, INTEGRAL FUEL TANK SEALANT/COATING USE: Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL:

9 JUNE '94 93 POSF 2980 + (JP-8 Additives) **TEST DATE START:** JP-8 BASELINE FUEL:

	TEST MAT	TERIAL / FUEL	EXPOSURE	TEST	EVALUA	TION CRIT	TERIA		EVAI	LUATION	OF TES	ST R	ESULT	rs
MATERIAL		RESULTS		CONTROL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	NTROL &	(OVERAL	Ĺ
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUIR	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	377	437	388	395		200			P	P	P	W	W	W
ELONGATION (%)	240	212	215	271		150%			P	P	P	W	W	W
VOLUME SWELL (%)	10	12	-1	N/A				8%	F	F	P	О	O	W
HARD'S; a) SHORE A (PTS)	53	53	53	53		30 PTS			P	P	P	\mathbf{W}	\mathbf{W}	\mathbf{W}
b) PENCIL														
COMP. SET (avg. 2 spcm's)														
LAP SHEAR (PSI)														
COHESION (%)	100	100	100	N/A		100%			P	P	P	\mathbf{W}	W	W
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)	26	28	27	N/A		12			P	P	P	\mathbf{W}	W	W
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														
	TEST FUE	L / MATERIAL	EXPOSURE		CONTR	OL FUEL								

	TEST FUEL	L / MATERIAL	EXPOSURE			CONTR	OL FUEL							
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	W) VS. POST (STRESSED) °	F 7 DAYS		SPECIFICA	TION RANGE	1	GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR	2 JP-8	ОВ	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	С	C1	C	C1	С	C1					
ACID NO. mgKOH/gm	NE	NE	NE	.001	.002	.001	.002	.003	.003		0.015			
GUMS mg/100ml	NE	NE	NE	2	4.8	4.4	2.8	9.6	8.6		7			
HYDROPEROXIDES mM/l	NE	NE	NE	.004	.037	0	.038	0	.018					
CONDUCTIVITY pS/m @72°F	10	166	363	108	39	248	131	912	410	150	600	О	W	W
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected;

W =Within Allowable Requirement; BD = Below Detection; P = Pass; F = Fail

O = Outside Allowable Requirement

UDRI TECH: UDRI ENG:

DATE:

24 MAR 98 J. DUES

OT =

Material Tested Beyond Temperature Range

UDRI P.I. ENG:

B. WILT D.H. KALT

N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

A.F. AUT. W./MLSE: __A. FLETCHER A.F. AUT. WL/POSF _S. A. ANDERSON

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists **Between Material Degradation and Fuel Properties Degradation**

TEST PLAN I.D. NO.	I.E.1	MATERIAL / IDENTITY:	EPOXY GRAPHITE
TEST TEMPERATURE (°F)	200	USE:	AIRFRAME, INTEGRAL FUEL TANK COMPOSITE
EXPOSURE TIME (DAYS)	7	TEST ADDITIVE/FUEL:	Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980
TEST DATE START:	9 JUNE '94	JP-8 BASELINE FUEL:	93 POSF 2980 + (JP-8 Additives)

	TEST MAT	TERIAL / FUEL	EXPOSURE		TEST	`EVALUA'	TION CRIT	TERIA		EVAI	LUATIO	N OF TE	ST R	ESUL	rs
MATERIAL		RESULTS		CONTR	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	ONTROL &		OVERAL	
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIE	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)															
ELONGATION (%)															
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)	8971	10107	9463	111	141	20%				20	9	15	W	W	W
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST FUEL	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	W) VS. POST ((STRESSED) °	F 7 DAYS		SPECI	FICATION	RANGE		GENERA	
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	2-8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-8		OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	С	C1	С	C1	С	C1				NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.002	.001	.002	.003	.003			0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	2	4.8	4.4	2.8	9.6	8.6			7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.001	.002	0	.032	0	.018				NE	NE	NE
CONDUCTIVITY pS/m @72°F	45	153	375	108	39	248	131	912	410	150		600	О	W	W
					1	1	1	1							

NOTES:

VISUAL OBSERVATIONS

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Not Evaluated; ND = Not Detected; **Designations:** NE =BD = Below Detection; P = Pass; F = Fail

W =Within Allowable Requirement; O = Outside Allowable Requirement

OT =**Material Tested Beyond Temperature Range**

N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

UDRI P.I. ENG: D.H. KALT * Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: A. FLETCHER Between Material Degradation and Fuel Properties Degradation A.F. AUT. WL/POSF S. A. ANDERSON

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

DATE:

UDRI TECH:

UDRI ENG:

24 MAR 98

J. DUES

B. WILT

TEST PLAN I.D. NO. **I.E.2 MATERIAL / IDENTITY: GRAPHITE BISMALIEMIDE IM7/5250-4-(bmi)** AIRFRAME, INTEGRAL FUEL TANK COMPOSITE TEST TEMPERATURE (°F) 200 USE: 7 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS) TEST ADDITIVE/FUEL:** 9 JUNE '94 **TEST DATE START:** JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

	TEST MAT	TERIAL / FUEL	EXPOSURE		TEST	'EVALUA'	TION CRIT	TERIA		EVAI	LUATIO	N OF TE	ST R	ESUL	ΓS
MATERIAL		RESULTS		CONTR	OL MAT	A	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO C	ONTROL &	(OVERAL	
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIF	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	NT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)															
ELONGATION (%)															
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)															
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)															
LAMINAR SHEAR (PSI)	11720	11960	12780	123	330	20%				5	3	4	\mathbf{W}	\mathbf{W}	W
RESISTIVITY (OHM-CM)															
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	W) VS. POST	(STRESSED) °	F 7 DAYS		SPECI	FICATION	RANGE		GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JF	P-8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-8		OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	С	C1	С	C1	С	C1				NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.002	.001	.002	.003	.003			0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	2	4.8	4.4	2.8	9.6	8.6			7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.004	.037	0	.038	0	.018				NE	NE	NE
CONDUCTIVITY pS/m @72°F	55	161	392	108	39	248	131	912	410	150		600	О	W	W

NOTES:

VISUAL OBSERVATIONS

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Not Evaluated: ND = Not Detected: **Designations:** NE =BD = Below Detection: P = Pass:

W =Within Allowable Requirement; O = Outside Allowable Requirement

OT =**Material Tested Beyond Temperature Range**

N/A =Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists **Between Material Degradation and Fuel Properties Degradation**

A.F. AUT. W./MLSE: __A. FLETCHER A.F. AUT. WL/POSF S. A. ANDERSON

24 MAR 98

J. DUES

B. WILT

D.H. KALT

DATE:

UDRI TECH:

UDRI P.I. ENG:

UDRI ENG:

TEST PLAN I.D. NO. I.F.3 MATERIAL / IDENTITY: POLYURETHANE, ESTER, YELLOW TYPE II

TEST TEMPERATURE (°F) 200 USE: AIRFRAME, FUEL TANK FOAM (ESM) MIL-B-83054

EXPOSURE TIME (DAYS) 7 TEST ADDITIVE/FUEL: Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980

TEST DATE START: 9 JUNE '94 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

	TEST MAT	TERIAL / FUEL	EXPOSURE	TEST	T EVALUA	TION CRIT	TERIA		EVAI	LUATIO	N OF TE	ST R	ESULT	rs
MATERIAL		RESULTS		CONTROL MAT	A.	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	NTROL &	(OVERAL	<u>. </u>
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUIF	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	16	15	16	16	40%				0	6	0	W	W	W
ELONGATION (%)	319	328	320	274	40				+16	+20	+27	\mathbf{W}	\mathbf{W}	\mathbf{W}
VOLUME SWELL (%)														
HARD'S; a) SHORE A (PTS)														
b) PENCIL														
COMP. SET (avg. 2 spcm's)														
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)	N/A	N/A	N/A	N/A										
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														

	TEST FUE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL							
FUELS	4 X 7 DA	Y PERIODS ((28 DAYS)		PRE-NEV	W) VS. POST (STRESSED) º	F 7 DAYS		SPECIFICAT	ΓΙΟΝ RANGE		GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR	JP-8	OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	С	C1	C	C1	С	C1			NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.002	.001	.002	.003	.003		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	.2	4.8	4.4	2.8	9.6	8.6		7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.004	.037	0	.038	0	.018			NE	NE	NE
CONDUCTIVITY pS/m @72°F	47	325	396	108	39	248	131	912	410	150	600	О	W	W
VISUAL OBSERVATIONS													·	

NOTES:

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected;

W = Within Allowable Requirement;

Material Tested Beyond Temperature Range

BD = Below Detection; P = Pass; F = Fail

O = Outside Allowable Requirement

UDRI TECH: J. DI
UDRI ENG: B. W
UDRI P.I. ENG: D.H.

DATE:

J. DUES
B. WILT
D.H. KALT

24 MAR 98

N/A = Not applicable;

OT =

NSR = No Spec. Req. and/or 4 (x) Additive Concentration

A.F. AUT. W./MLSE: <u>A. FLETCHER</u> A.F. AUT. WL/POSF <u>S. A. ANDERSON</u>

^{*} Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists Between Material Degradation and Fuel Properties Degradation

TEST EVALUATION CRITERIA

TEST PLAN I.D. NO. **I.F.4 MATERIAL / IDENTITY:** POLYURETHANE, ETHER, BLUE TYPE IV AIRFRAME, FUEL TANK FOAM (ESM) MIL-B-83054 TEST TEMPERATURE (°F) 200 USE: 7 Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **EXPOSURE TIME (DAYS)** TEST ADDITIVE/FUEL: 9 JUNE '94 **TEST DATE START:** JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

										12 1 1 1 1	201110	I OI IL	<i>J</i> I I I I I		LO
MATERIAL		RESULTS		CONTRO	OL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	ONTROL &	(OVERALI	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASU	RED AT		REQUIR	REMENT		ALLOWA	BLE REQUI	REMENTS	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIEN	T TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	10	10	9	9)	40%				+11	+11	0	W	W	W
ELONGATION (%)	150	146	150	11	15	40				+30	+27	+30	\mathbf{W}	W	W
VOLUME SWELL (%)															
HARD'S; a) SHORE A (PTS)															
b) PENCIL															
COMP. SET (avg. 2 spcm's)															
LAP SHEAR (PSI)															
COHESION (%)														-	
TAPE ADHESION (P/F)															
PEEL STRENGTH (LB/IN)														-	
LAMINAR SHEAR (PSI)															
RESISTIVITY (OHM-CM)	N/A	N/A	N/A	N.	/A										
TORQUE (INCH -LBS.)															
RUPTURE PRESS. (IN.HG)															
VISUAL OBSERVATIONS															
	TEST FILE	L / MATERIAL	EXPOSURE			CONTR	OL FUEL								
FUELS		Y PERIODS (PRE-NEV	W) VS. POST ((STRESSED) °1	F 7 DAYS		SPECI	IFICATION	RANGE	(GENERAI	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JF	P-8	JP-8	+ 100	JP-8 +	100 x4		FOR JP-8		OBS	SERVATIO	
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN		MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	C	C1	C	C1	C	C1				NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.002	.001	.002	.003	.003			0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	2	4.8	4.4	2.8	9.6	8.6			7	NE	NE	NE
HYDROPEROXIDES mM/I	NE	NE	NE	.004	.037	0	.038	0	.018				NE	NE	NE

NOTES:

CONDUCTIVITY pS/m @72°F

VISUAL OBSERVATIONS

Fuel Color: C = Clear C1 - C6 = Light to Dark

108

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fa

519

W = Within Allowable Requirement; O = Outside Allowable Requirement

108

OT = Material Tested Beyond Temperature Range

489

TEST MATERIAL / FUEL EXPOSURE

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

DATE: 24 MAR 98
UDRI TECH: J. DUES
UDRI ENG: B. WILT
UDRI P.I. ENG: D.H. KALT
A.F. AUT. W/MLSE: A. FLETCHER
A.F. AUT. WL/POSF S. A. ANDERSON

600

0

 \mathbf{W}

 \mathbf{W}

150

EVALUATION OF TEST RESULTS

Overall Evaluation: When JP-8+100 and/or x4 Results are Equal To or Exceeds JP-8 Results, or within allowable tolerance requirement, the Overall Evaluation is Rated as "W"

39

248

131

912

410

TEST PLAN I.D. NO. **MATERIAL / IDENTITY:** POLYURETHANE (ETHER), GREY CONDUCTIVE CLASS I I.F.5 AIRFRAME, FUEL TANK FOAM (ESM) MIL-F-87206 TEST TEMPERATURE (°F) 200 USE: **EXPOSURE TIME (DAYS)** 7 **TEST ADDITIVE/FUEL:** Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980 **TEST DATE START:** 9 JUNE '94 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

	TEST MAT	ERIAL / FUEL	EXPOSURE	TEST	EVALUA	TION CRIT	TERIA		EVAI	LUATION	OF TE	ST R	ESULT	ГS
MATERIAL		RESULTS		CONTROL MAT	A.	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	NTROL &		OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUIF	REMENT		ALLOWA	BLE REQUIE	REMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	16	15	16	19	40%				-16	-21	-5	W	W	W
ELONGATION (%)	131	123	138	133	40				-2	-8	+4	W	W	\mathbf{W}
VOLUME SWELL (%)														
HARD'S; a) SHORE A (PTS)														
b) PENCIL														
COMP. SET (avg. 2 spcm's)														
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)	2.76E11	3.06E11	1.84E11						P	P	P	\mathbf{W}	W	\mathbf{W}
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														

	TEST FUEI	L / MATERIAL	EXPOSURE			CONTR	OL FUEL							
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	V) VS. POST (STRESSED) °1	F 7 DAYS		SPECIFICAT	TION RANGE		GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	?-8	JP-8	+ 100	JP-8 +	100 x4	FOR	JP-8	OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	C	C1	C	C1	C	C1			NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.002	.001	.002	.003	.003		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	2	4.8	4.4	2.8	9.6	8.6		7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.004	.037	0	.038	0	.018			NE	NE	NE
CONDUCTIVITY pS/m @72°F	145	303	538	108	39	248	131	912	410	150	600	0	W	W
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected;

W = Within Allowable Requirement;

BD = Below Detection; P = Pass; F = Fail O = Outside Allowable Requirement DATE: 24 MAR 98
UDRI TECH: J. DUES
UDRI ENG: B. WILT
UDRI P.I. ENG: D.H. KALT

OT = Material Tested Beyond Temperature Range N/A = Not applicable; NSR = No Spec. Reg. a

NSR = No Spec. Req. and/or 4 (x) Additive Concentration

A.F. AUT. W./MLSE: A.F. LETCHER
A.F. AUT. WL/POSF S. A. ANDERSON

Between Material Degradation and Fuel Properties Degradation

^{*} Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

TEST PLAN I.D. NO. I.G.2 MATERIAL / IDENTITY: NITRILE, MIL-P-25732
TEST TEMPERATURE (°F) 200 USE: AIRFRAME, FUEL SYSTEM GASKETS "O" RING

EXPOSURE TIME (DAYS) 7 TEST ADDITIVE/FUEL: Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980

TEST DATE START: 9 JUNE '94 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

	TEST MAT	ERIAL / FUEL	EXPOSURE	TEST	EVALUA'	TION CRIT	TERIA		EVAI	LUATION	OF TE	ST R	ESULT	ΓS
MATERIAL		RESULTS		CONTROL MAT	Al	LLOWABLE	TOLERAN	CE		ISON TO CO			OVERALI	
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUIF	REMENT		ALLOWA	BLE REQUIE	REMENTS	EV	ALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	1150	1112	1185	1489	25%				-23	-25	-20	W	W	W
ELONGATION (%)	153	148	155	188	25				-19	-21	-19	\mathbf{W}	W	W
VOLUME SWELL (%)	16	16	15	N/A		0		25	P	P	P	\mathbf{W}	W	W
HARD'S; a) SHORE A (PTS)	67	67	66	74	5		5		-7	-7	-8	OT	OT	OT
b) PENCIL													I	
COMP. SET (avg. 2 spcm's)	27	37	31	N/A				50	P	P	P	\mathbf{W}	W	W
LAP SHEAR (PSI)													<u> </u>	
COHESION (%)													<u> </u>	
TAPE ADHESION (P/F)													<u> </u>	
PEEL STRENGTH (LB/IN)													i	
LAMINAR SHEAR (PSI)													<u> </u>	
RESISTIVITY (OHM-CM)													<u> </u>	
TORQUE (INCH -LBS.)													<u> </u>	
RUPTURE PRESS. (IN.HG)									_					
VISUAL OBSERVATIONS													<u> </u>	

	TEST FUEL	L / MATERIAL	EXPOSURE			CONTR	OL FUEL							
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	V) VS. POST (STRESSED) °I	F 7 DAYS		SPECIFICAT	TION RANGE	(GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	Jl	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR	JP-8	OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	NE	NE	NE	C	C1	C	C1	C	C1			NE	NE	NE
ACID NO. mgKOH/gm	NE	NE	NE	.001	.002	.001	.002	.003	.003		0.015	NE	NE	NE
GUMS mg/100ml	NE	NE	NE	2	4.8	4.4	2.8	9.6	8.6		7	NE	NE	NE
HYDROPEROXIDES mM/l	NE	NE	NE	.004	.037	0	.038	0	.018			NE	NE	NE
CONDUCTIVITY pS/m @72°F	4	160	680	108	39	248	131	912	410	150	600	О	\mathbf{W}	О
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail DATE:

W = Within Allowable Requirement; O = Outside Allowable Requirement UDRI TECH:

 W =
 Within Allowable Requirement;
 O = Outside Allowable Requirement
 UDRI TECH:
 J. DUES

 OT =
 Material Tested Beyond Temperature Range
 UDRI ENG:
 B. WILT

24 MAR 98

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration UDRI P.I. ENG: D.H. KALT

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

D.H. KALT

A.F. AUT. W./MLSE: A.F. ETCHER

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

A.F. AUT. WL/POSF

S. A. ANDERSON

TEST PLAN I.D. NO. I.G.6/II.G.9 FLUOROCARBON, MIL-R-83248 **MATERIAL / IDENTITY:** ENGINE/AIRFRAME, GASKET "O" RING TEST TEMPERATURE (°F) 200 USE: **EXPOSURE TIME (DAYS)** 7 **TEST ADDITIVE/FUEL:** Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980

93 POSF 2980 **TEST DATE START:** 9 JUNE '94 JP-8 BASELINE FUEL: + (JP-8 Additives)

	TEST MAT	TERIAL / FUEL	EXPOSURE	TECT	TENTAL TIA	TION ODI	CEDIA		EXZAT		I OF THE	OTE D	DOLL	EC
	ILSI MA	EMAL / FUEL	L2H OBCKL	IESI	EVALUA	TION CRIT	EKIA		EVAL	LUATION	OF TE	51 K	ESUL:	15
MATERIAL		RESULTS		CONTROL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	NTROL &		OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUIF	REMENT		ALLOWA	BLE REQUII	REMENTS	EV	ALUATI	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	1846	1767	1734	1823	20%				+1	-3	-5	W	W	W
ELONGATION (%)	212	200	200	193	20%				+10	+4	+4	\mathbf{W}	W	W
VOLUME SWELL (%)	4	4	3	N/A		0		10%	P	P	P	\mathbf{W}	W	\mathbf{W}
HARD'S; a) SHORE A (PTS)	75	75	74	75	5		5		О	О	-1	\mathbf{W}	W	W
b) PENCIL														
COMP. SET (avg. 2 spcm's)	9	7	9	N/A				60	P	P	P	W	W	W
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)									_					
VISUAL OBSERVATIONS														

	TEST FUEI	L / MATERIAL	EXPOSURE			CONTRO	OL FUEL							
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	V) VS. POST (STRESSED) °I	F 7 DAYS		SPECIFICAT	TION RANGE	(GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	P-8	JP-8	+ 100	JP-8 +	100 x4	FOR	JP-8	OBS	SERVATI	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)				C	C1	С	C1	С	C1			NE	NE	NE
ACID NO. mgKOH/gm				.001	.002	.001	.002	.003	.003		0.015	NE	NE	NE
GUMS mg/100ml				2	4.8	4.4	2.8	9.6	8.6		7	NE	NE	NE
HYDROPEROXIDES mM/l				.004	.037	0	.038	0	.018			NE	NE	NE
CONDUCTIVITY pS/m @72°F	40	441	491	108	39	248	131	912	410	150	600	0	W	W
VISUAL OBSERVATIONS														

24 MAR 98

J. DUES

NOTES:

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = FailDATE: UDRI TECH:

W =Within Allowable Requirement; O = Outside Allowable Requirement OT =**Material Tested Beyond Temperature Range**

UDRI ENG: B. WILT Not applicable: NSR = No Spec. Req. and/or 4 (x) Additive Concentration UDRI P.I. ENG: D.H. KALT N/A =* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: A. FLETCHER A.F. AUT. WL/POSF S. A. ANDERSON

Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO. **II.G.2 MATERIAL / IDENTITY:** FLUORISILICONE, MIL-R-25988 ENGINE/AIRFRAME, FUEL SYSTEM GASKET "O" RING TEST TEMPERATURE (°F) 325 USE: **EXPOSURE TIME (DAYS)** 7 **TEST ADDITIVE/FUEL:** Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980

7 SEPT '94 93 POSF 2980 **TEST DATE START:** JP-8 BASELINE FUEL: + (JP-8 Additives)

	TECT MAT	ERIAL / FUEL	EVDOCLIDE	mm.cm								are n		
	IESI WAI	ERIAL / FUEL	EAFOSURE	TEST	EVALUA	TION CRIT	ERIA		EVAL	LUATION	OF TE	ST R	ESULI	rs
MATERIAL		RESULTS		CONTROL MAT	A	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	NTROL &	(OVERALI	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUIF	REMENT		ALLOWA	BLE REQUII	REMENTS	EV	VALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	124	157	229	896	45%				-86	-82	-74	OT	W	W
ELONGATION (%)	97	121	153	214	35				-55	-43	-29	OT	W	W
VOLUME SWELL (%)	11	11	11	N/A		0		25	P	P	P	\mathbf{W}	W	W
HARD'S; a) SHORE A (PTS)	40	41	45	67	20				27	26	22	OT	W	W
b) PENCIL														
COMP. SET (avg. 2 spcm's)	77	61	53	N/A				30	F	F	F	OT	W	W
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)													1	
RUPTURE PRESS. (IN.HG)	_								_					
VISUAL OBSERVATIONS														

	TEST FUEL	L / MATERIAL	EXPOSURE			CONTR	OL FUEL							
FUELS	4 X 7 DA	Y PERIODS (28 DAYS)		PRE-NEV	V) VS. POST (STRESSED) ºI	F 7 DAYS		SPECIFICAT	TION RANGE	(GENERAI	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	JI	JP-8 PRE POST C C1		+ 100	JP-8 +	100 x4	FOR	JP-8	OBS	SERVATION	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)				C	C1	C	C1	C	C1			NE	NE	NE
ACID NO. mgKOH/gm	.003	.010	.004	.001	.003	.001	.006	.003	.008		0.015	\mathbf{W}	W	W
GUMS mg/100ml				2	6.2	4.4	6.4	9.6	8.6		7	NE	NE	NE
HYDROPEROXIDES mM/l	.025	BAD EML	BAD EML	.004	.037	0	.038	0	.018			NE	NE	NE
CONDUCTIVITY pS/m @72°F	335	1830	870	108	125	248	144	912	410	150	600	W	0	О
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail

DATE: W =Within Allowable Requirement; O = Outside Allowable Requirement UDRI TECH: OT =**Material Tested Beyond Temperature Range** UDRI ENG:

Not applicable: NSR = No Spec. Req. and/or 4 (x) Additive Concentration UDRI P.I. ENG: D.H. KALT N/A =

24 MAR 98

J. DUES

B. WILT

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: A. FLETCHER Between Material Degradation and Fuel Properties Degradation A.F. AUT. WL/POSF S. A. ANDERSON

TEST PLAN I.D. NO. II.G.3/I.G.7 FLUOROCARBON, MIL-R-83485 **MATERIAL / IDENTITY:** TEST TEMPERATURE (°F) 325 ENGINE/AIRFRAME, GASKET "O" RING USE: **EXPOSURE TIME (DAYS)** 7 **TEST ADDITIVE/FUEL:** Betz/Dearborn 8O462 ((Normal and x4 Concentrations) /93 POSF 2980

7 SEPT '94 93 POSF 2980 **TEST DATE START:** JP-8 BASELINE FUEL: + (JP-8 Additives)

	TENERIC A A A T	TABLA L / EXTEST	EXPOCUE						T					
	TEST MAT	ERIAL / FUEL	EXPOSURE	TEST	'EVALUA'	TION CRIT	TERIA		EVAI	LUATION	OF TE	ST R	ESUL7	ſS
MATERIAL		RESULTS		CONTROL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	NTROL &	(OVERAL	Ĺ
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUIF	REMENT		ALLOWA	BLE REQUII	REMENTS	EV	VALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	1194	1314	1211	1644	20%				-27	-20	-26	0	W	W
ELONGATION (%)	178	186	179	166	20				+7	+12	+8	\mathbf{W}	W	\mathbf{W}
VOLUME SWELL (%)	10	1	9	N/A		0		10	P	P	P	\mathbf{W}	W	\mathbf{W}
HARD'S; a) SHORE A (PTS)	70	72	70	76	5		5		-6	-4	-6	О	W	W
b) PENCIL														
COMP. SET (avg. 2 spcm's)	40	33	37	N/A				60	P	P	P	\mathbf{W}	W	\mathbf{W}
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)									_					
VISUAL OBSERVATIONS														

	TEST FUEL	L / MATERIAL	EXPOSURE			CONTR	OL FUEL							
FUELS	4 X 7 DA	Y PERIODS ((28 DAYS)		PRE-NEV	V) VS. POST	STRESSED) °	F 7 DAYS		SPECIFICAT	TION RANGE		GENERA	L
PROPERTY TESTS*	JP-8	JP-8 +100	JP8+100 (X4)	Jl	PRE POST C C2		+ 100	JP-8 +	100 x4	FOR	JP-8	OBS	SERVATIO	ONS
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	C3	C4	C2	C	C2	C	C2	C	C2			W	О	W
ACID NO. mgKOH/gm	0.004	0.007	0.005	.001	.002	.001	.003	.003	.01		0.015	\mathbf{W}	W	W
GUMS mg/100ml	3.6	7.4	26	2	3	4.4	3.4	9.6	12.2		7	\mathbf{W}	0	О
HYDROPEROXIDES mM/l	0.027	0.017	0.022	.004	NE	0	0.011	0.016	NE			W	W	W
CONDUCTIVITY pS/m @72°F	34	83	417	108	4	248	57	912	241	150	600	О	0	\mathbf{W}
VISUAL OBSERVATIONS														

24 MAR 98

J. DUES

B. WILT

A.F. AUT. WL/POSF S. A. ANDERSON

UDRI ENG:

NOTES:

Fuel Color: $\mathbf{C} =$ Clear C1 - C6 = Light to Dark

Designations: NE =Not Evaluated; ND = Not Detected;

BD = Below Detection; P = Pass; F = FailDATE: W =Within Allowable Requirement; O = Outside Allowable Requirement UDRI TECH:

OT =**Material Tested Beyond Temperature Range**

Not applicable: NSR = No Spec. Req. and/or 4 (x) Additive Concentration UDRI P.I. ENG: D.H. KALT N/A =* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists A.F. AUT. W./MLSE: A. FLETCHER

Between Material Degradation and Fuel Properties Degradation

TEST PLAN I.D. NO.II.G.7MATERIAL / IDENTITY:FLUOROSILICONE, MIL-R-25988TEST TEMPERATURE (°F)325USE:ENGINE/AIRFRAME, GASKET "O" RINGEXPOSURE TIME (DAYS)7TEST ADDITIVE/FUEL:Betz/Dearborn 8Q462 ((Normal and x4 Concentrations) /93 POSF 2980

TEST DATE START: 18 OCT '94 JP-8 BASELINE FUEL: 93 POSF 2980 + (JP-8 Additives)

	TEST MAT	ERIAL / FUEL	EXPOSURE	TEST	'EVALUA'	TION CRIT	TERIA		EVAI	LUATION	OF TE	ST R	ESUL?	ΓS
MATERIAL		RESULTS		CONTROL MAT	Al	LLOWABLE	TOLERAN	CE	COMPAR	ISON TO CO	NTROL &	(OVERAL	L
PROPERTY TESTS	JP-8	JP-8 +100	JP8+100 (X4)	MEASURED AT		REQUIF	REMENT		ALLOWA	BLE REQUIE	REMENTS	EV	VALUATIO	ON
(AVG. 5 SPECIMENS)	POST	POST	POST	AMBIENT TEMP	DECREASE	MIN VALUE	INCREASE	MAX VALUE	JP-8	JP-8+100	JP-8+100x4	JP8	+100	X4
TENSILE (PSI)	626	632	654	1088	45%				-42	-42	-40	W	W	W
ELONGATION (%)	126	132	130	126	35				0	+5	+3	W	\mathbf{W}	\mathbf{W}
VOLUME SWELL (%)	7	6	6	N/A		0		25	P	P	P	\mathbf{W}	\mathbf{W}	\mathbf{W}
HARD'S; a) SHORE A (PTS)	68	67	69	76	20				-8	-9	-7	\mathbf{W}	W	\mathbf{W}
b) PENCIL														
COMP. SET (avg. 2 spcm's)	32	33	30	N/A				30	F	F	P	OT	OT	\mathbf{W}
LAP SHEAR (PSI)														
COHESION (%)														
TAPE ADHESION (P/F)														
PEEL STRENGTH (LB/IN)														
LAMINAR SHEAR (PSI)														
RESISTIVITY (OHM-CM)														
TORQUE (INCH -LBS.)														
RUPTURE PRESS. (IN.HG)														
VISUAL OBSERVATIONS														

FUELS PROPERTY TESTS*	TEST FUEL / MATERIAL EXPOSURE			CONTROL FUEL										
	4 X 7 DAY PERIODS (28 DAYS)			PRE-NEW) VS. POST (STRESSED) °F 7 DAYS						SPECIFICATION RANGE		GENERAL		
	JP-8	JP-8 +100	JP8+100 (X4)	JP-8		JP-8 + 100		JP-8 + 100 x4		FOR JP-8		OBSERVATIONS		
	POST	POST	POST	PRE	POST	PRE	POST	PRE	POST	MIN	MAX	JP8	+100	X4
COLOR (7 DAYS)	C2	C2	C3	C	C2	C	C2	С	C2			W	W	W
ACID NO. mgKOH/gm	.006	.006	NE	.001	.007	.001	.006	.003	.008		0.015	W	W	NE
GUMS mg/100ml	8.2	11.8	17.4	2	3	4.4	3.4	9.6	12.2		7	0	0	О
HYDROPEROXIDES mM/l	.011	.003	NE	.004	.007	0	.015	0	.008			W	W	W
CONDUCTIVITY pS/m @72°F	71	158	518	108	123	248	141	912	555	150	600	0	\mathbf{W}	W
VISUAL OBSERVATIONS														

NOTES:

Fuel Color: C = Clear C1 - C6 = Light to Dark

Designations: NE = Not Evaluated; ND = Not Detected; BD = Below Detection; P = Pass; F = Fail DATE:

W = Within Allowable Requirement; O = Outside Allowable Requirement

OT = Material Tested Beyond Temperature Range

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration

UDRI TECH:

J. DUES

B. WILT

D.H. KALT

24 MAR 98

N/A = Not applicable; NSR = No Spec. Req. and/or 4 (x) Additive Concentration UDRI P.I. ENG: D.H. KALT

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

A.F. AUT. W./MLSE: A.F.LETCHER

* Fuel Property Test Data Was Collected to Establish Whether Any Correlation Exists

Between Material Degradation and Fuel Properties Degradation

A.F. AUT. WL/POSF S. A. ANDERSON